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United States Patent [19]
Nagashima et al.**[11] Patent Number: 5,537,673**
[45] Date of Patent: Jul. 16, 1996**[54] CAR STEREO HAVING A REMOVABLE PANEL****[75] Inventors: Akira Nagashima; Tadao Nuka, both of Saitama-ken, Japan****[73] Assignee: Pioneer Electronic Corporation, Tokyo, Japan****[21] Appl. No.: 490,644****[22] Filed: Jun. 15, 1995****Related U.S. Application Data****[63] Continuation of Ser. No. 64,550, May 20, 1993, abandoned.****[30] Foreign Application Priority Data**May 25, 1992 [JP] Japan 4-157502
Nov. 10, 1992 [JP] Japan 4-324963**[51] Int. Cl.⁶ H04B 1/06****[52] U.S. Cl. 455/346; 455/351; 455/74; 455/89****[58] Field of Search 455/74, 89, 345, 455/348, 346, 90, 347, 351; 340/539, 426; 379/58-59, 63, 433, 440; 381/86****[56] References Cited****U.S. PATENT DOCUMENTS**4,287,599 9/1981 Goncharoff et al. 455/77
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5,239,700 8/1993 Guenther et al. 455/345
5,276,728 1/1994 Pagliaroli et al. 340/539**FOREIGN PATENT DOCUMENTS**0461572 12/1991 European Pat. Off. 455/345
0483956 5/1992 European Pat. Off. 455/345
3726784 2/1989 Germany 455/345**Primary Examiner—Reinhard J. Eisenzopf****Assistant Examiner—Andrew Faile****Attorney, Agent, or Firm—Nikaido, Marmelstein, Murray & Oram****[57] ABSTRACT**

A removable panel has a plurality of operation buttons for operating a car stereo. A cellular telephone system operated by the operation buttons is provided in the panel. A controller is provided in the panel for rendering the car stereo inoperative in response to an instruction received through the cellular telephone system.

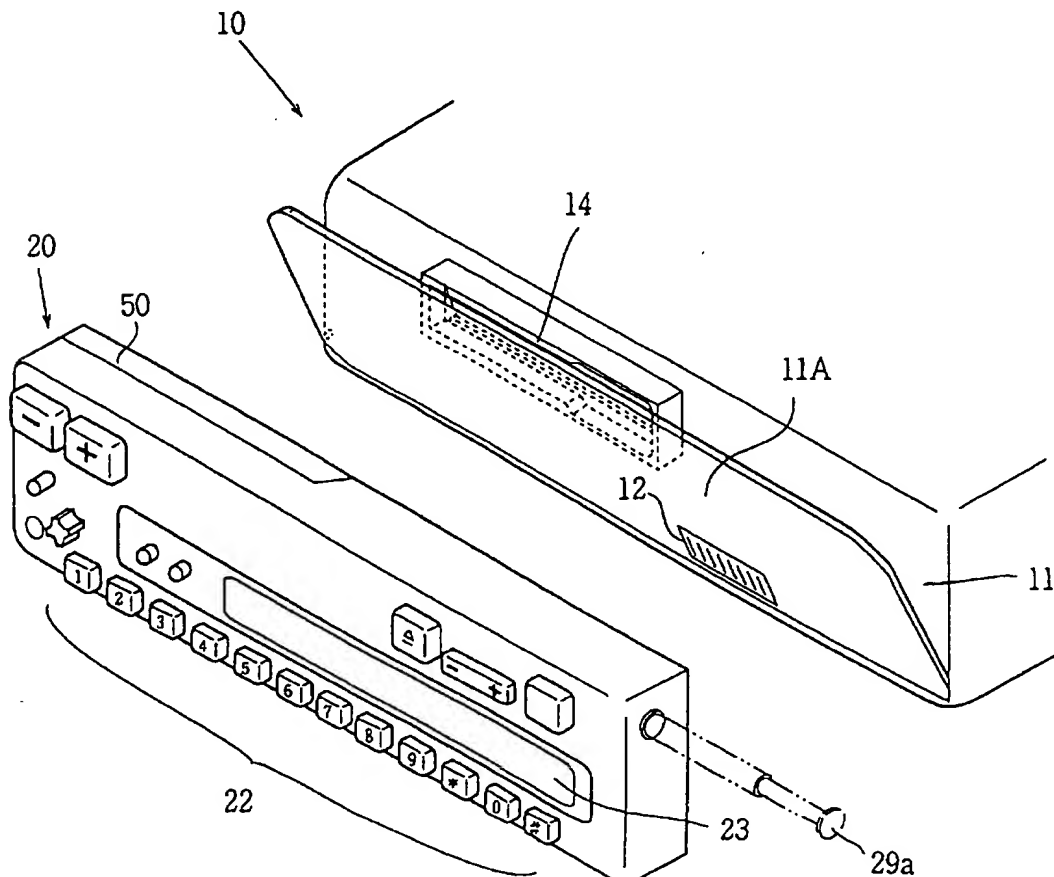
7 Claims, 15 Drawing Sheets

FIG. 1

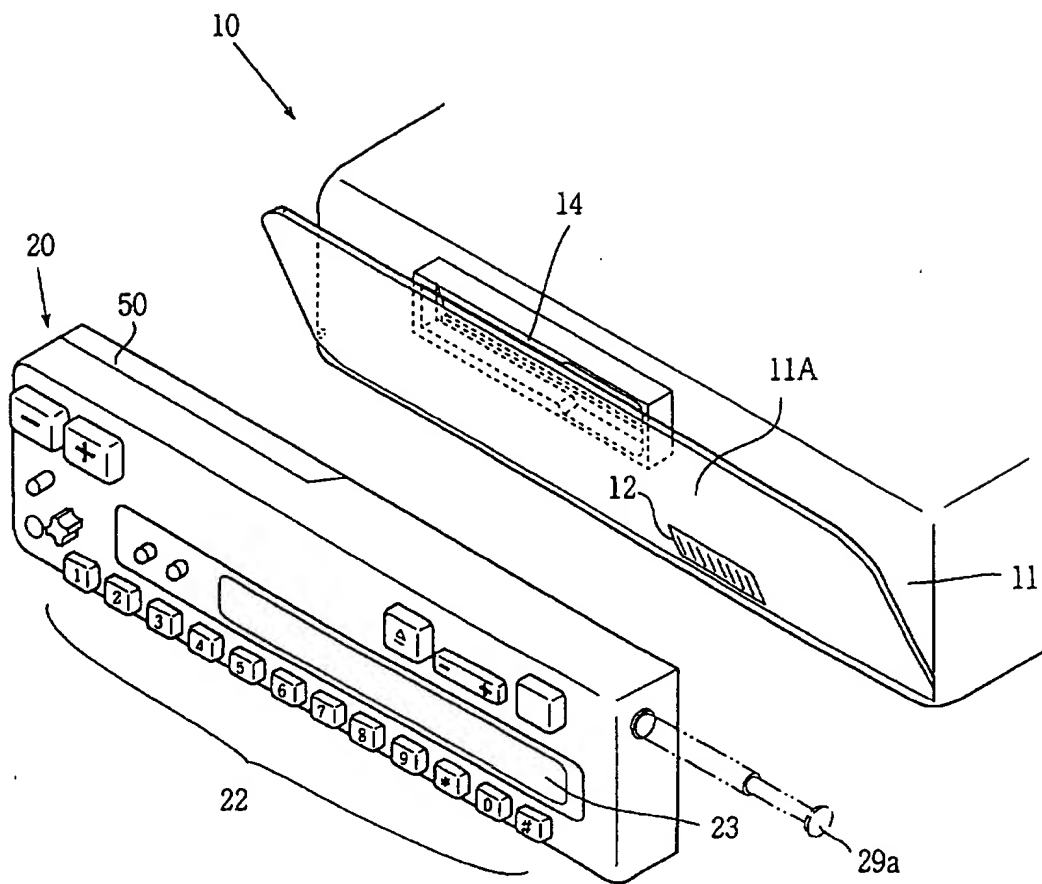


FIG. 2

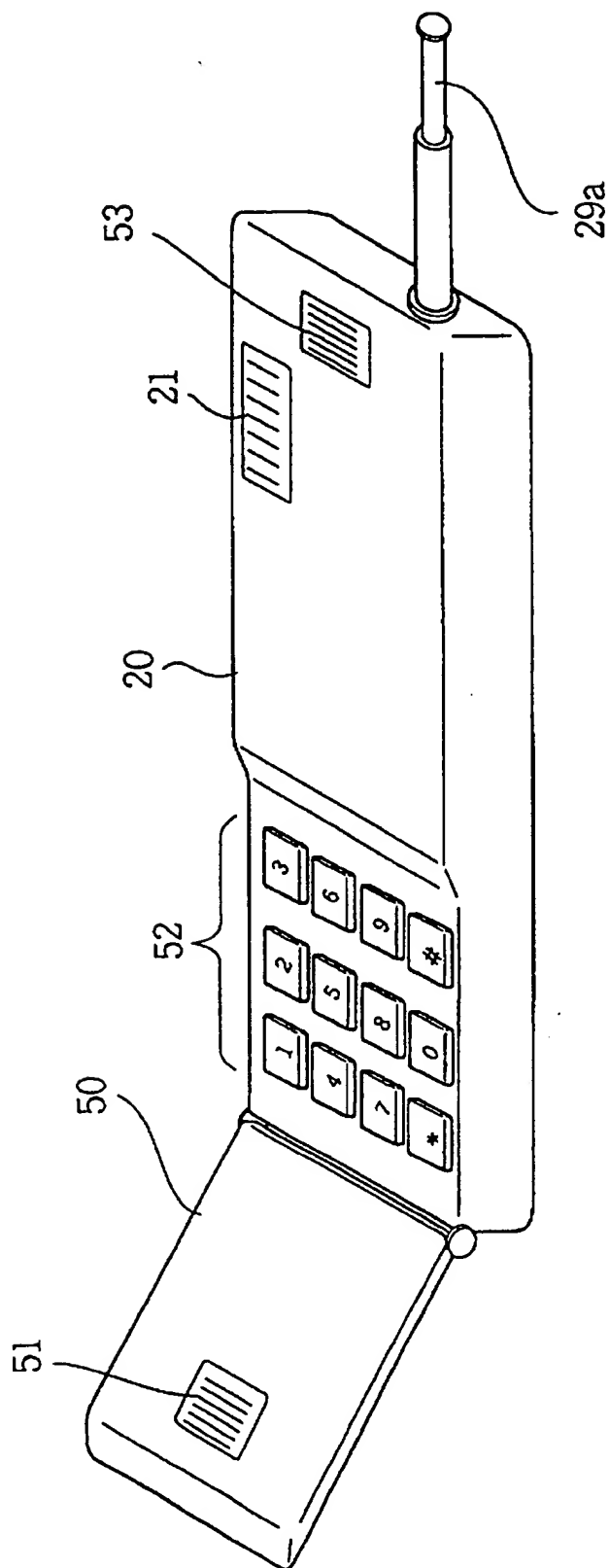


FIG. 3

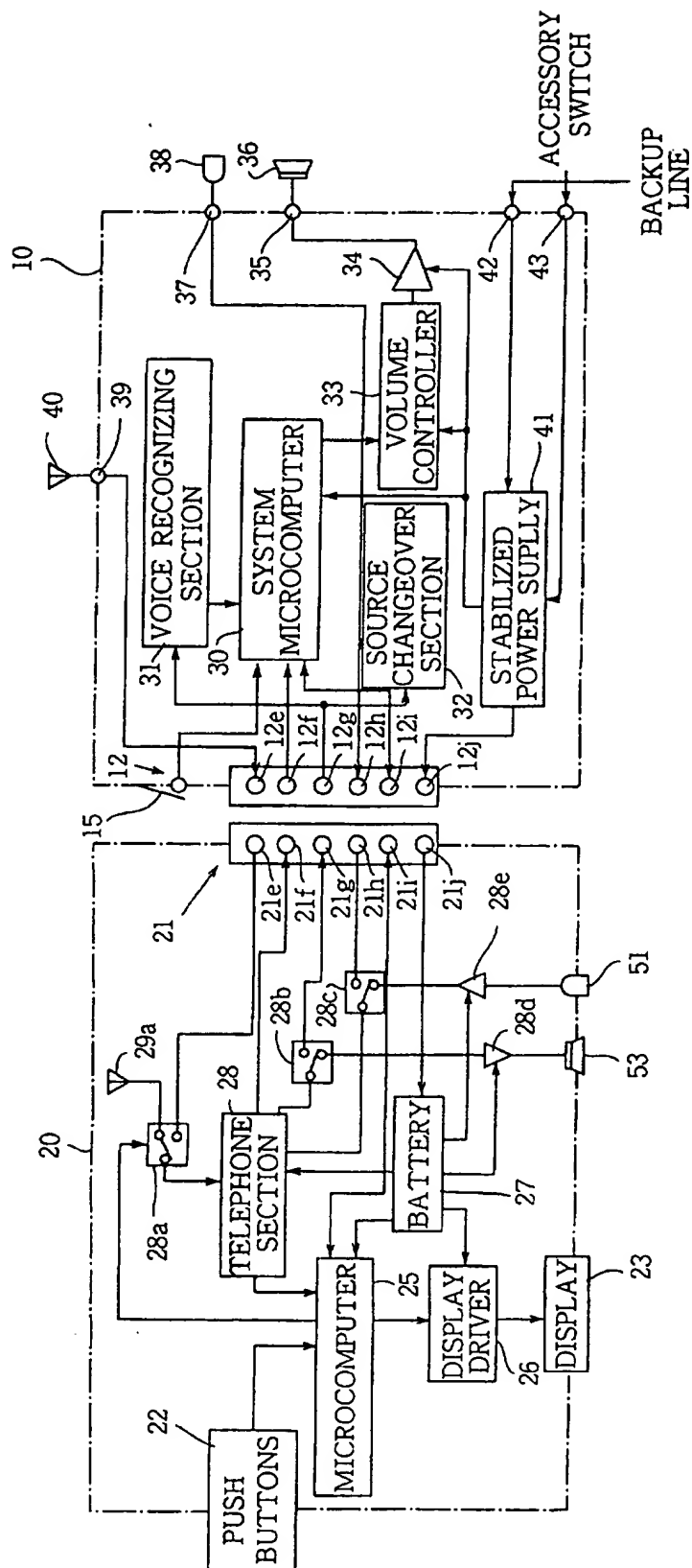
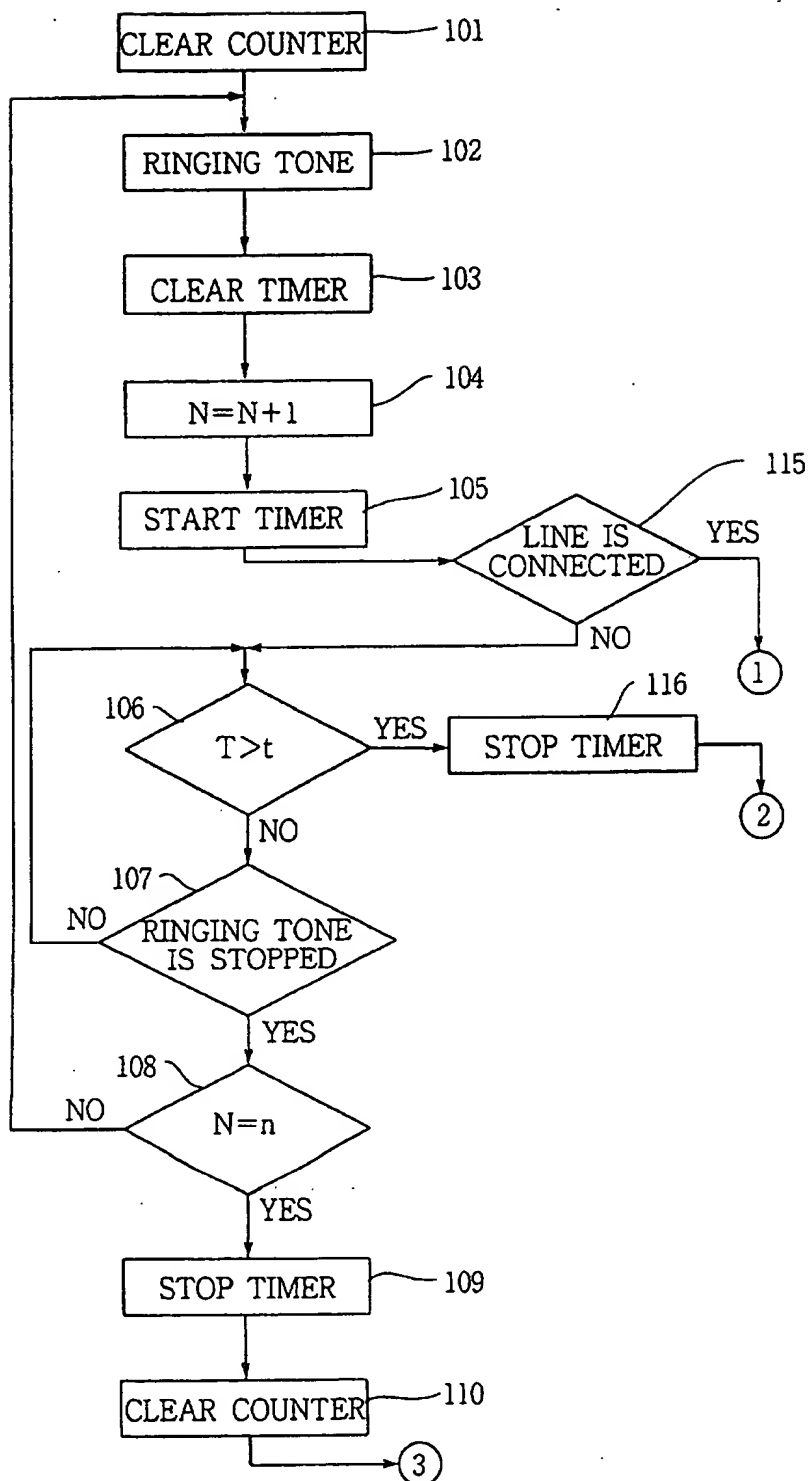


FIG. 4 a



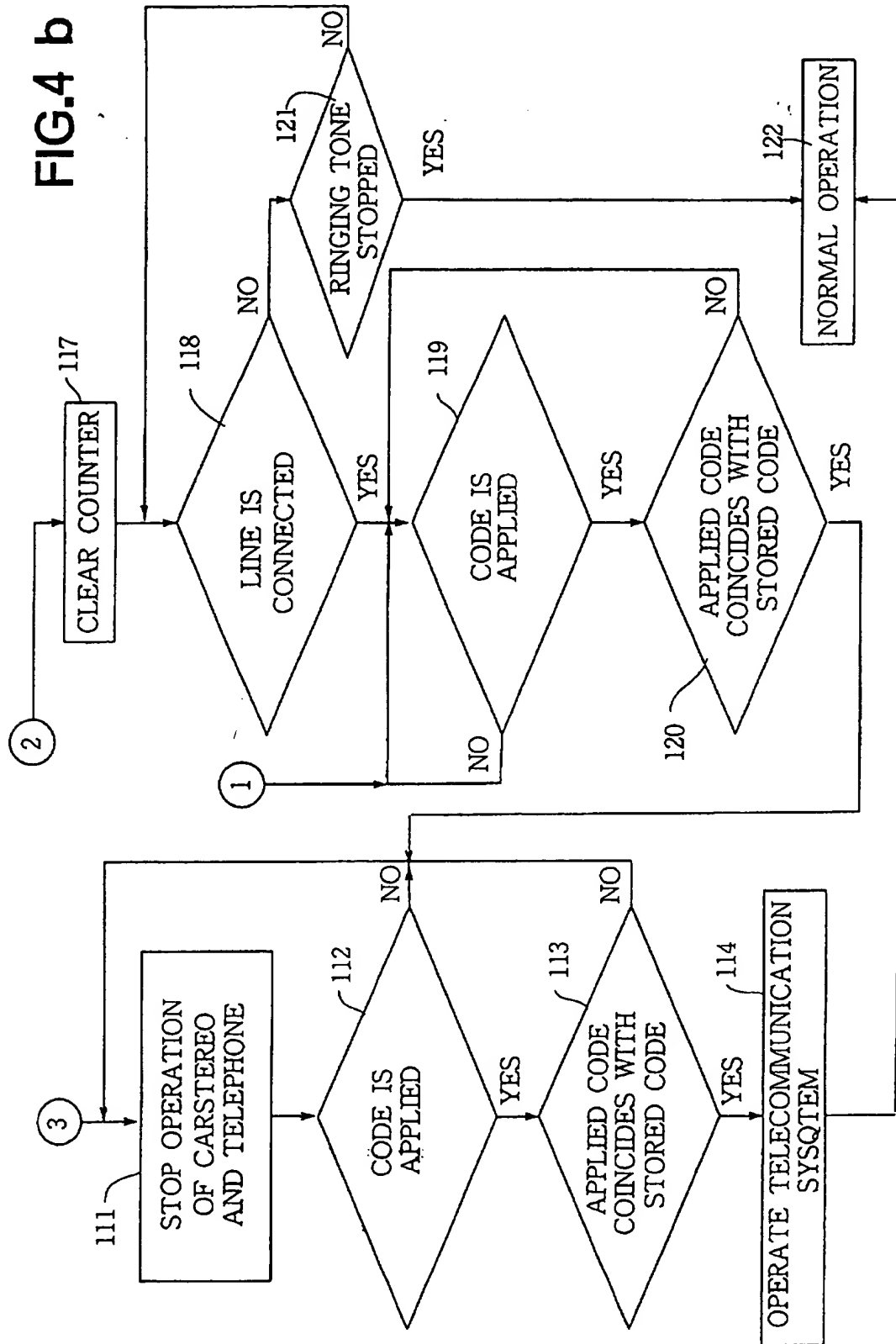


FIG. 5

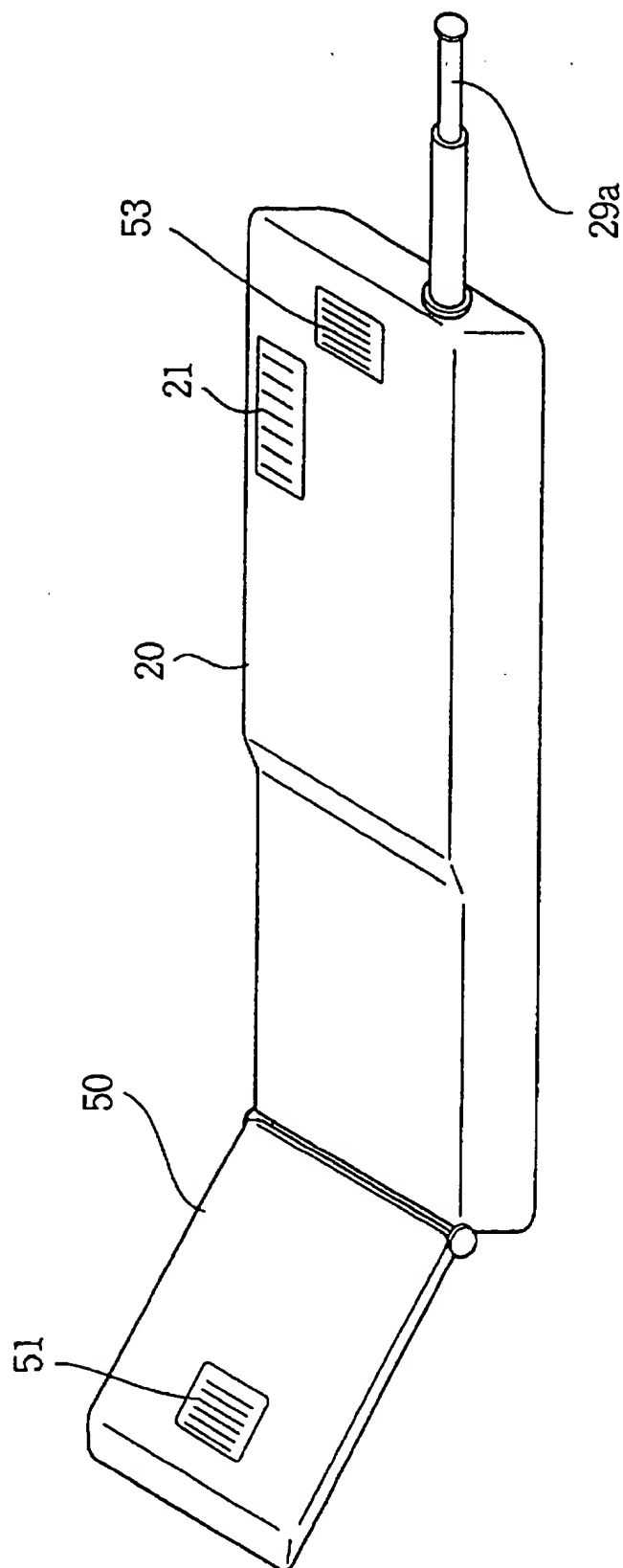


FIG. 6

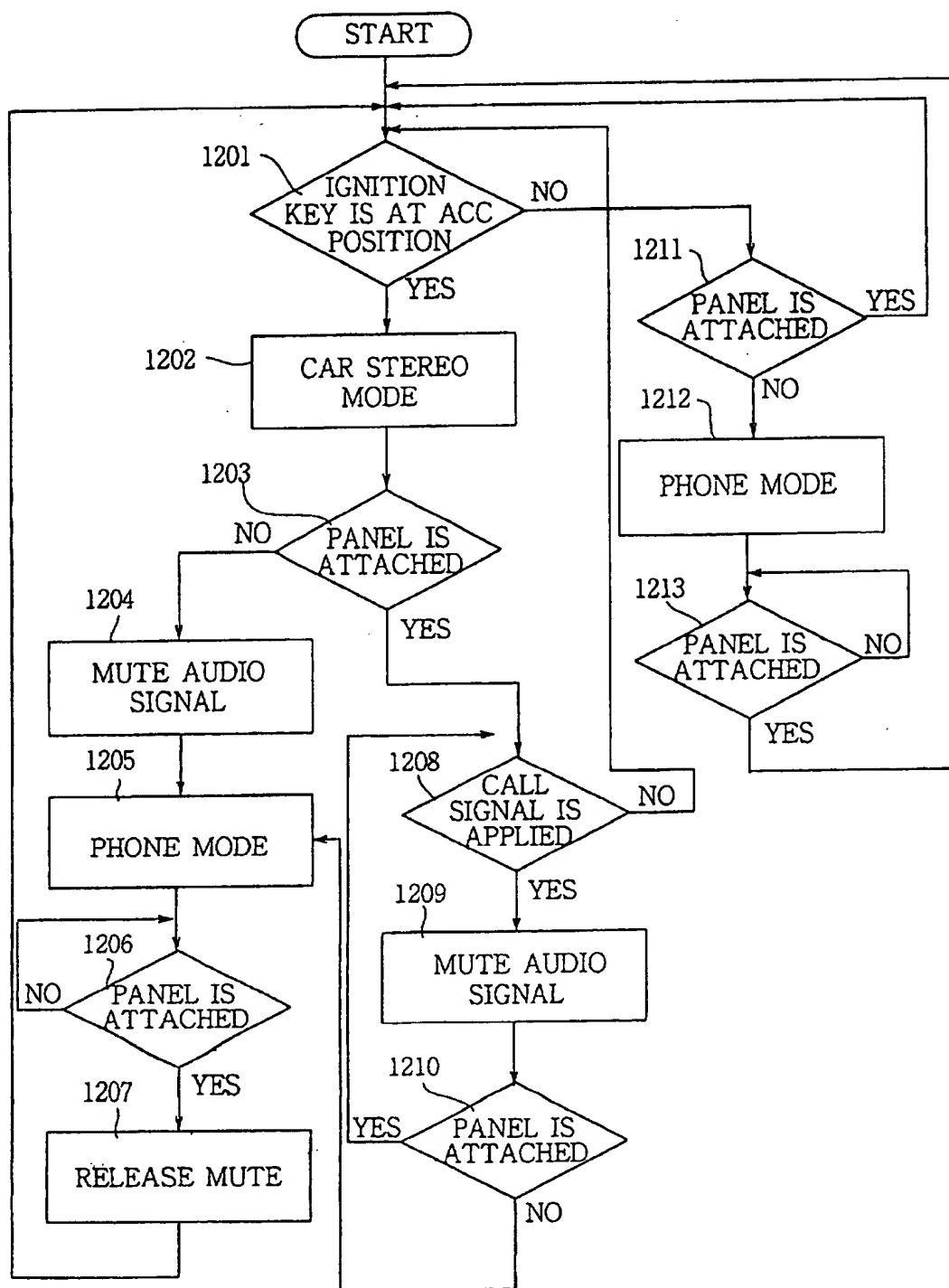


FIG. 7

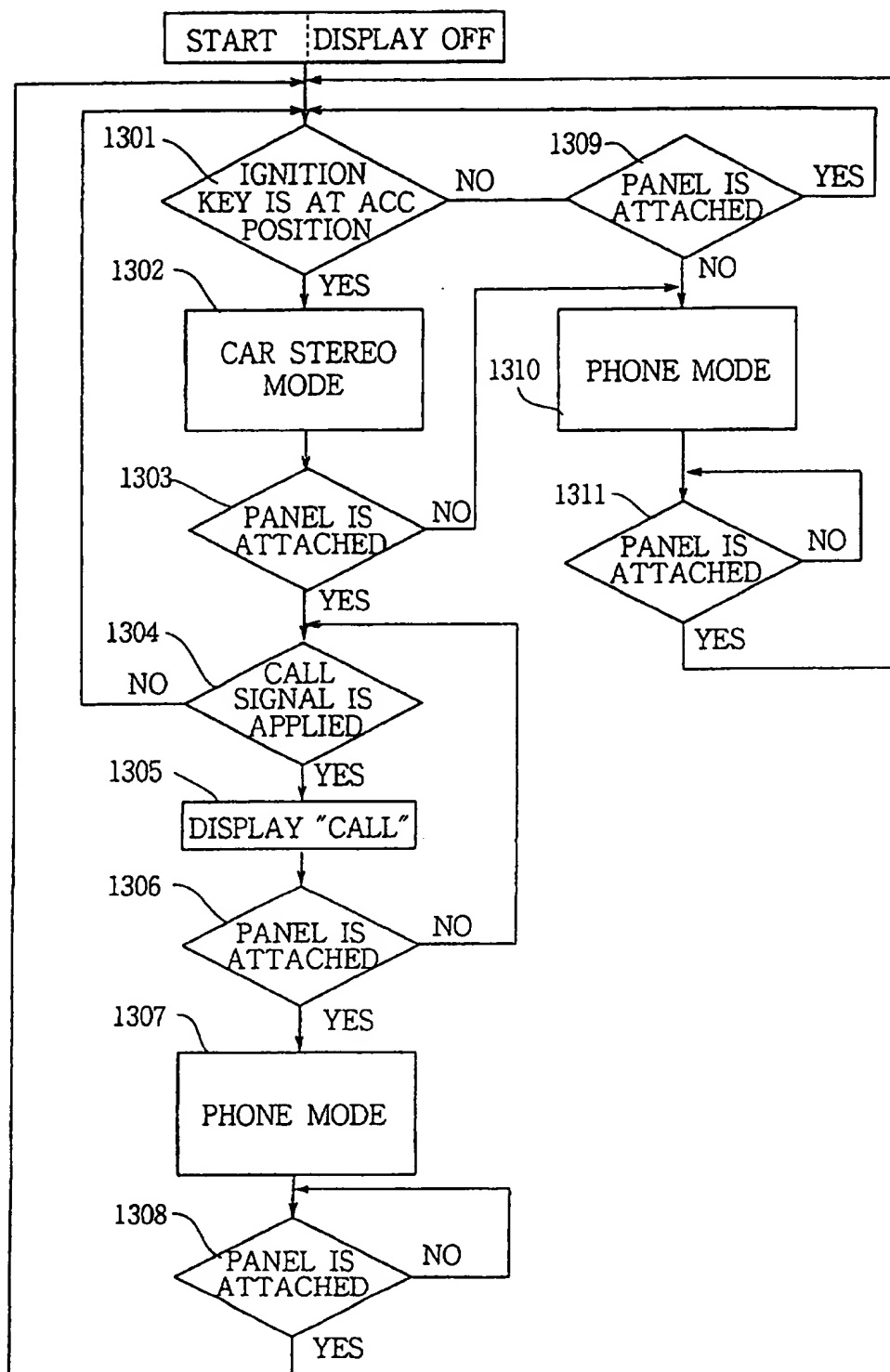


FIG.8

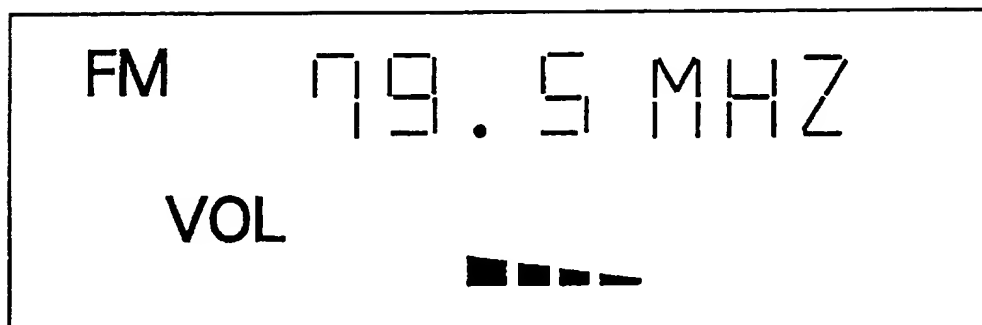


FIG.9

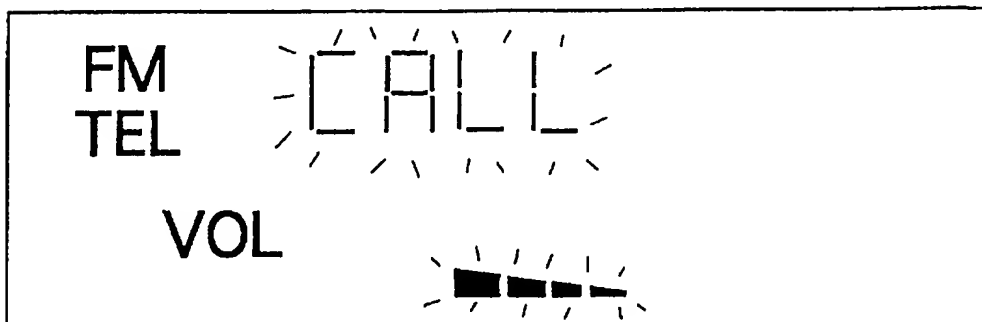


FIG.10

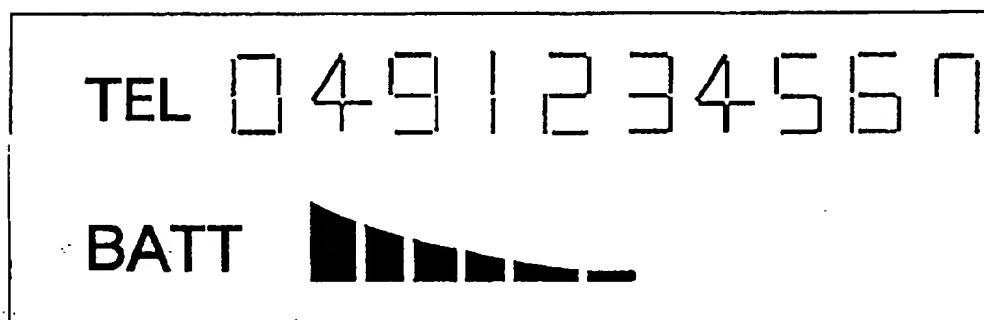


FIG. 11

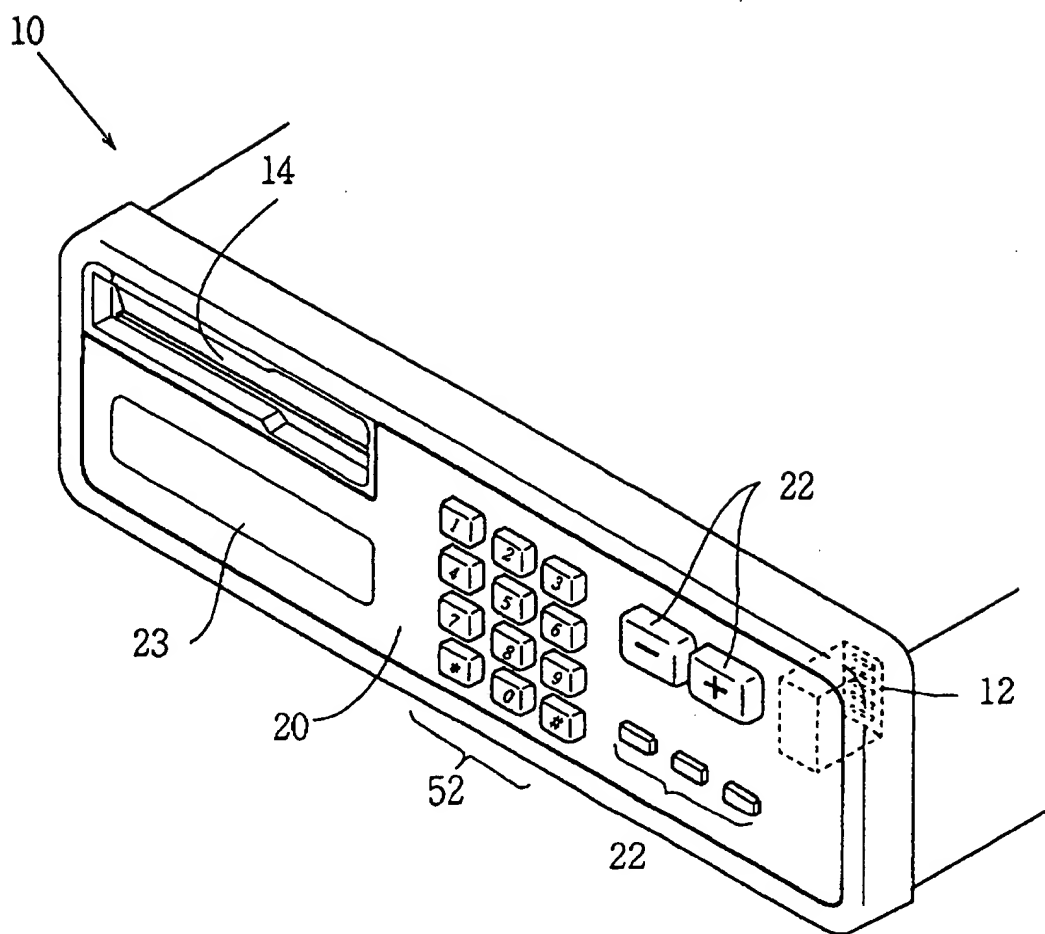


FIG.12

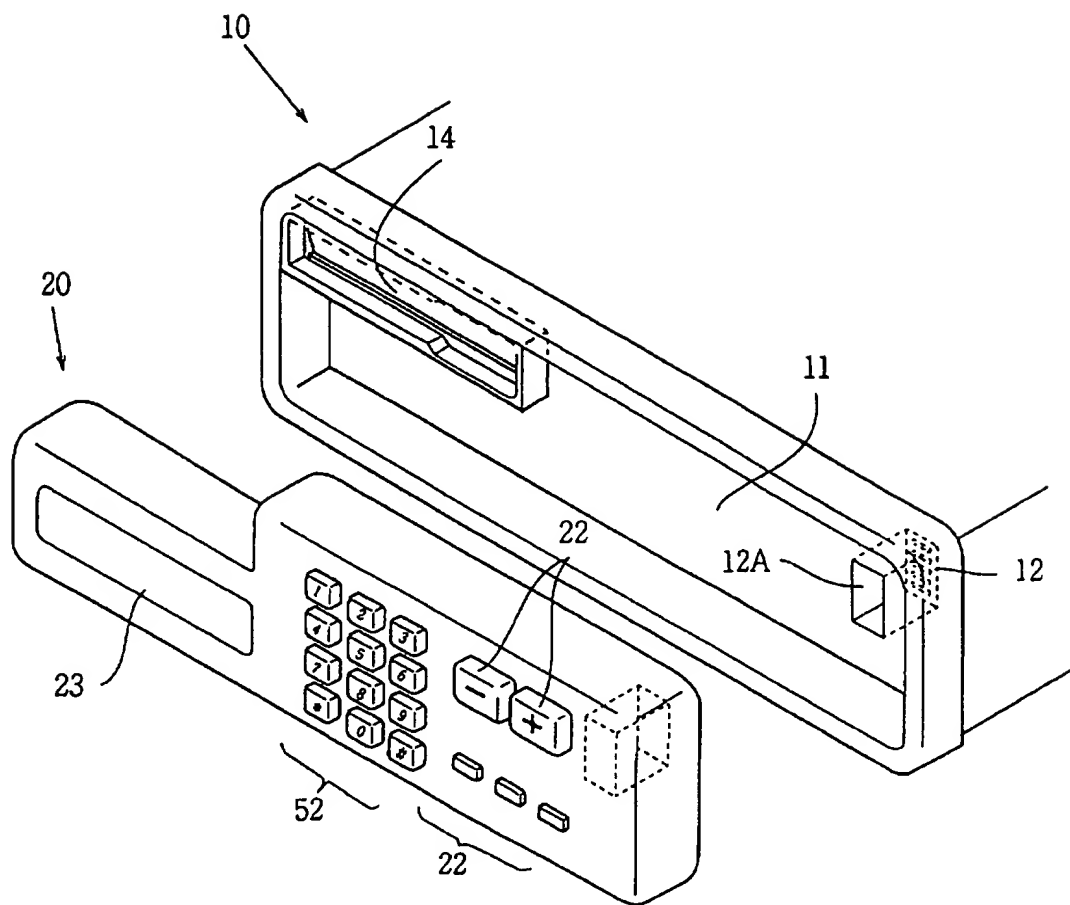


FIG.13

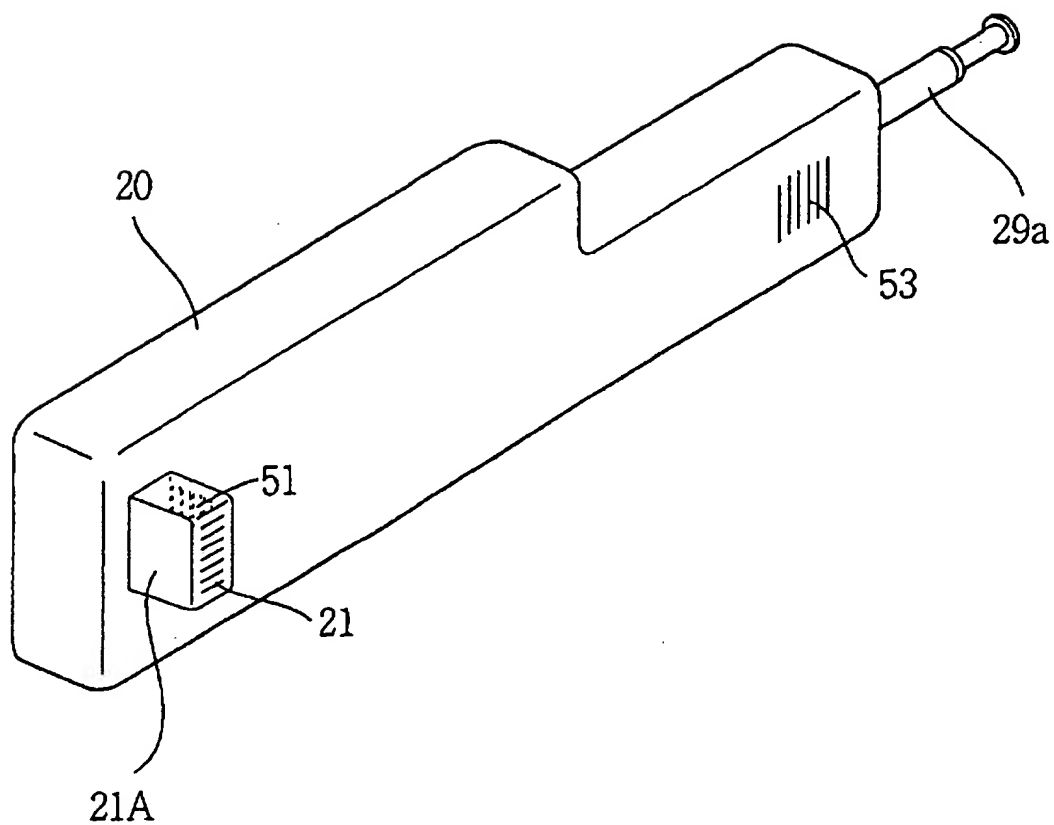


FIG.14

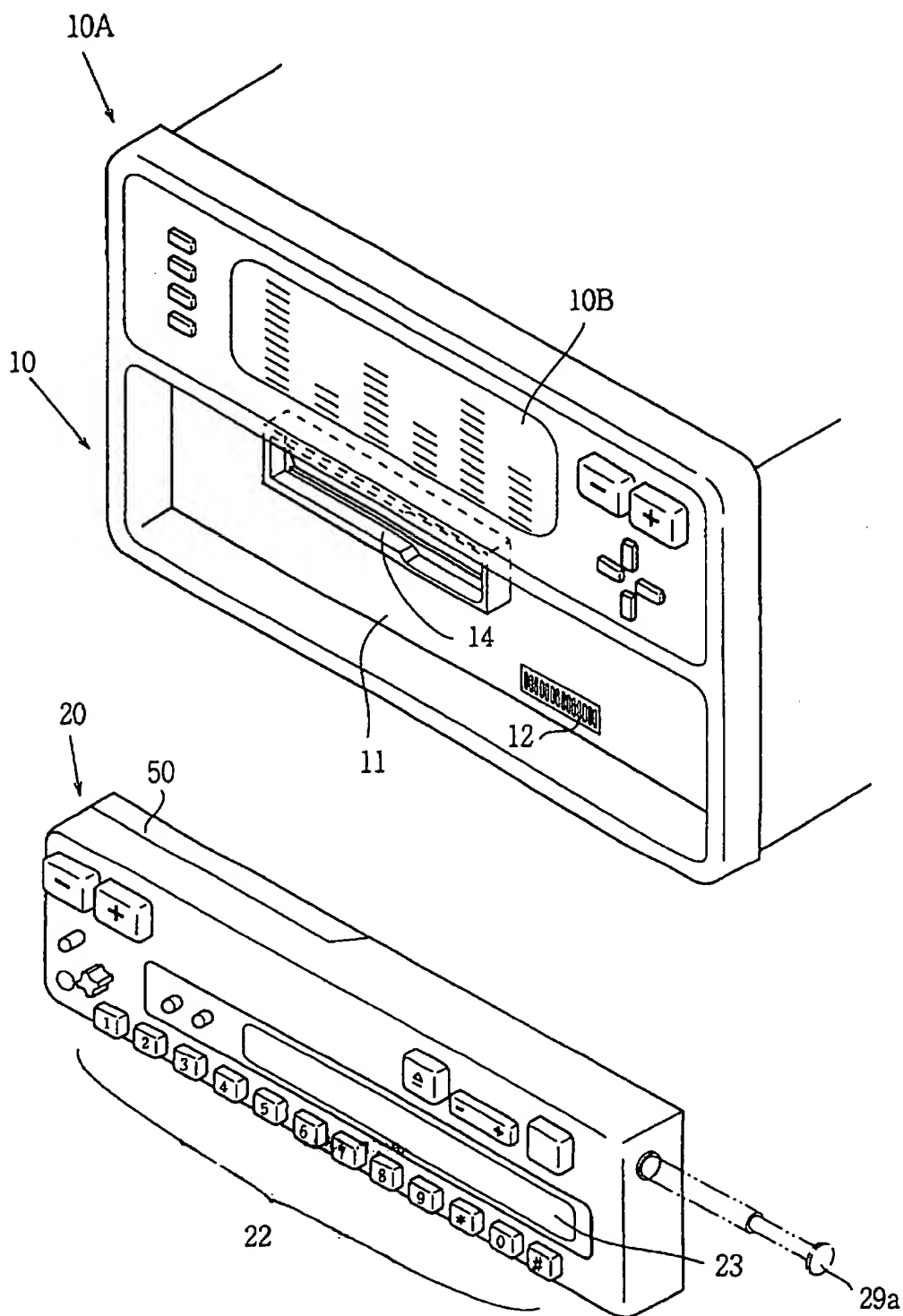


FIG.15

PRIOR ART

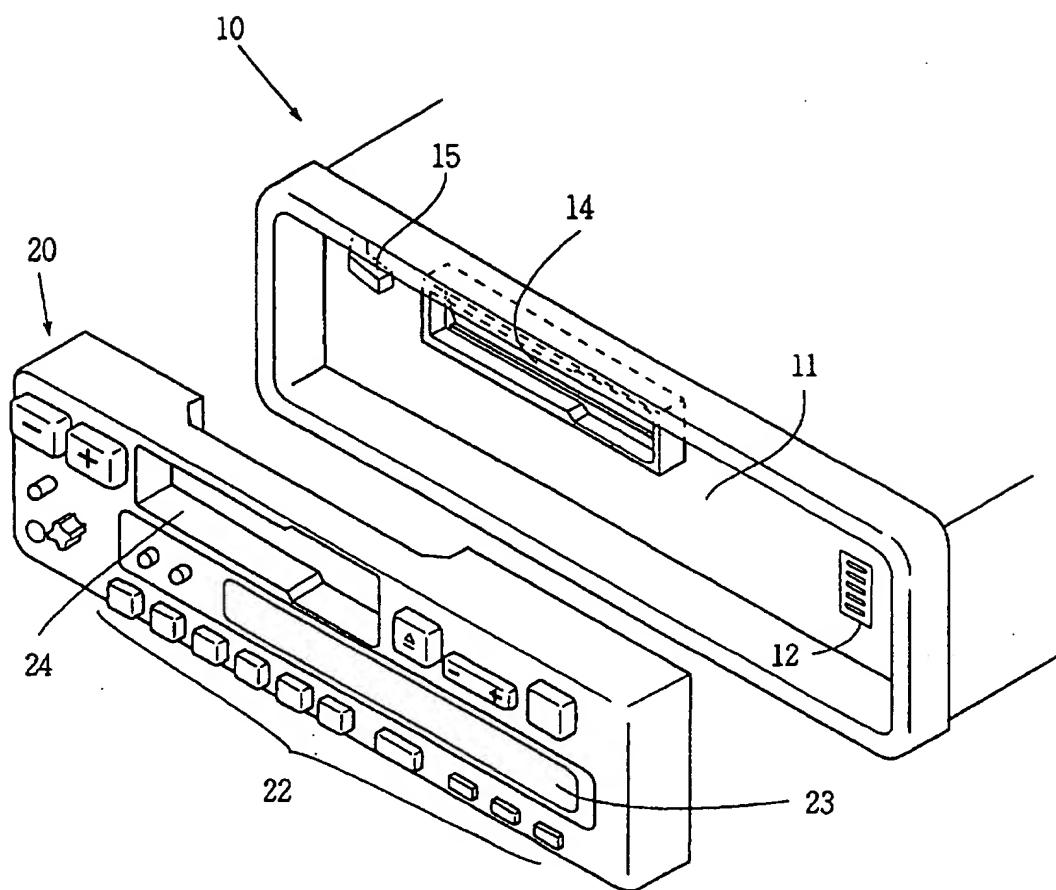
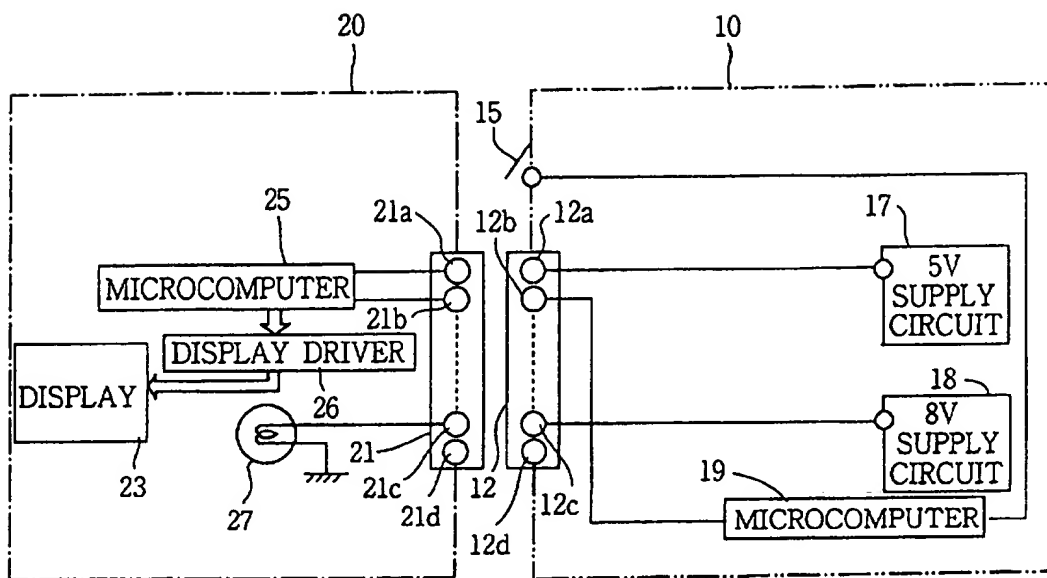


FIG.16

PRIOR ART



CAR STEREO HAVING A REMOVABLE PANEL

This application is a continuation of application Ser. No. 08/064,550 filed May 20, 1993 abandoned.

FIELD OF THE INVENTION

The present invention relates to a car stereo provided with a removable panel, and more particularly to a car stereo provided with a telecommunication system.

BACKGROUND OF THE INVENTION

Increase in the use of a sophisticated car stereo in recent years has caused an increase in theft of these stereos. In order to prevent the theft of the stereo, there has been many proposals. In accordance with one of the proposals, a removable panel having a plurality of push buttons for control of the stereo is attached to the body of the stereo.

FIG. 15 shows the above described prior art. The car stereo comprises a car stereo body 10 and a removable panel 20 attached to the body 10. The body 10 has recessed panel 11 mounted at the front thereof. The panel 11 has a cassette opening 14. A detector switch 15 is provided on an upper left hand side of the panel 20 to mechanically detect the attachment of the panel 20 on the body 10. A connector 12 which is connected to a connector 21 (FIG. 16) provided at the back of the panel 20 when the panel is attached, are formed on the panel 11. The panel 20 has a cassette opening 24 which coincides with the cassette opening 14 of the body 10 and various operation keys 22. A display 23 is disposed at a central portion of the panel 20 so as to indicate information such as current time and the received frequency of the stereo.

Referring to FIG. 16 the connector 12 of the body 10 has a 5 V supply terminal 12a, data input/output terminal 12b, 8 V supply terminal 12c, and ground terminal 12d. The terminals 12a and 12c are connected to a 5 V supply circuit 17 and an 8 V supply circuit 18, respectively. The data input/output terminal 12b is connected to a microcomputer 19. The microcomputer 19 is connected to the detector switch 15 so as to be operated in accordance with the operating state of the switch 15.

The connector 21 of the panel 20 has terminals which correspond to the terminals 12a to 12d of the connector 12. Namely, there is provided a 5 V input terminal 21a, data input/output terminal 21b, 8 V input terminal 21c, and ground terminal 21d. The terminal 21a is connected to a microcomputer 25 so as to supply a 5 V voltage thereto. The microcomputer 25 receives data from the microcomputer 19 through the data input/output terminals 12b and 21b dependent on the operation of the operation keys 22 on the panel 20, such as the time and the frequency of the radio. The microcomputer 25 applies a control signal to a display driver 26 to indicate the received data on the display 23. The 8 V input terminal 21c is connected to a lamp 27 for lighting the display 23.

When the panel 20 is attached to the body 10, the terminals 21a to 21d of the connector 21 are connected to the respective terminals 12a to 12d of the connector 12. Accordingly, the 5 V supply circuit 17 and the 8 V supply circuit 18 are connected to the microcomputer 25 and the lamp 27, respectively, thereby operating them. The microcomputer 25 is applied with various data from the microcomputer 19 through the terminals 12b and 21b, so that, the microcom-

puter 25 operates to drive the display 23, thereby indicating information on the display 23.

On the contrary, when the panel 20 is detached, the detector switch 15 is opened. The microcomputer 19 stops feeding the data to the microcomputer 25. Thus the display 23 of the panel 20 does not show information.

When the panel 20 is removed from the stereo body 10, the stereo body 10 does not have the appearance of a car stereo. Hence, if the driver takes the panel 20 with him when leaving the vehicle, the theft of the car stereo is prevented.

However, since the panel detached from the stereo body 10 is utterly useless and hence will only be a hindrance, the driver is often reluctant to carry the panel around.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a car stereo having a removable panel wherein the panel is provided with a transmitter device so that the driver will voluntarily take the panel when leaving the car.

According to the present invention there is provided a car stereo having a removable panel attached to a body of the car stereo, the panel having a plurality of operation buttons for operating the car stereo, comprising a cellular telephone system provided in the panel, a battery provided in the panel for operating the cellular telephone system, control means provided in one of the car stereo body and the panel for rendering the car stereo inoperative in response to an instruction received through the cellular telephone system.

In an aspect of the invention, the cellular telephone system is operated through the operation buttons of the panel. The panel has a display for displaying conditions of the car stereo, and the panel has a display driver for displaying operation of the cellular telephone.

The other objects and features of this invention will become understood from the following description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of a car stereo of the present invention having a removable panel;

FIG. 2 is a perspective view of the removable panel of the car stereo of FIG. 1;

FIG. 3 is a block diagram of a control circuit provided in a body and the panel of the car stereo;

FIGS. 4a and 4b show a flowchart describing the operation of the present invention;

FIG. 5 is a perspective view of a removable panel of a second embodiment of the present invention;

FIG. 6 is a flowchart showing the operation for changing the operation mode of push buttons, provided in the panel of FIG. 5;

FIG. 7 is a flowchart showing the operation for changing the operation mode of a display provided in the panel of FIG. 5;

FIG. 8 is an illustration of the display in a car stereo mode; FIG. 9 is an illustration of the display when receiving a call;

FIG. 10 is an illustration of the display in a phone mode;

FIG. 11 is a perspective view of a modification of the car stereo of the present invention;

FIG. 12 is a perspective view of the car stereo of FIG. 11 when a removable panel is detached;

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FIG. 13 is a perspective view of the removable panel of FIG. 12;

FIG. 14 is a perspective view of another modification of the car stereo of the present invention;

FIG. 15 is a perspective view of a conventional car stereo having a removable panel; and

FIG. 16 is a block diagram of a control circuit provided in a body and a panel of the conventional car stereo.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A car stereo according to the present invention is described hereinafter. The same parts in FIGS. 1 to 3 as those of FIGS. 15 and 16 are identified by the same references as in FIGS. 15 and 16 so that the further descriptions thereof are omitted.

Referring to FIG. 1, the car stereo has a car stereo body 10 and a removable panel 20 provided with a telecommunication system. The body 10 has the cassette opening 14 and a flap 11a having the connector 12. The flap 11a is rotatably connected to the front lower edge of the front panel 11 so as to be downwardly opened.

The panel 20 which serves as a cellular portable telephone as a radio telephone is provided with a telescopic rod antenna 29a projectable from the side of the panel 20. The operation buttons 22 under the display 23 are numbered so as to be used as push buttons for the telephone.

As shown in FIG. 2, on the back of the panel are formed the connector 21 which is connected to the connector 12 of the flap 11a when attached to the body 10, and a speaker 53. The panel 20 further has a recess wherein a matrix of numbered push buttons 52 for the telephone are provided. The push buttons 52 are covered by a lid 50 which is pivotally connected to a side edge of the panel 20. A microphone 51 is formed on the lid 50, facing the push buttons 52.

Referring to FIG. 3, the control circuit provided in the car stereo body 10 has a stabilized power supply 41 which is connected to a backup line and an accessory switch of the car through external input terminals 42 and 43, respectively. The stabilized power supply 41 is connected to a system microcomputer 30, volume controller 33 and an amplifier 34. The system microcomputer 30 is applied with signals from the detector switch 15, voice recognizing section 31, and from the panel 20 through the connectors 12 and 21 and accordingly applies signals to the volume controller 33 and to the panel. For example, when a call signal is fed from the panel 20 to the microcomputer 30, the volume controller 33 is operated to attenuate audio signals applied from a source changeover section 32 to a speaker 36 through the amplifier 34 and an external output terminal 35. Thus the volume of sound generated by the speaker 36 is decreased to a predetermined level when using the telephone. The source changeover section 32 is connected to the panel 20, CD player, cassette player and a tuner of the car stereo. The voice recognizing section 31 is provided for recognizing a predetermined instruction applied through an outside line for controlling the car stereo, the operation of which will be later described.

The control circuit in the panel 20 has a battery 27 which is connected to the stabilized power supply 41 provided in the car stereo body 10 through accessory line and terminals 21j and 12j of the connectors 21 and 12, respectively, so as to be charged whenever the panel 20 is attached to the body

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10. The battery 27 is connected to the microcomputer 25, which applies data to the system microcomputer 30 in the body 10 through terminals 12i and 21i of the connectors 12 and 21, respectively, in accordance with the operation of the operation buttons 22 on the front or the push buttons 52 in the back of the panel 20. The system computer 30 accordingly applies data to the microcomputer 25, thereby to indicate the data on the display 23 through the display driver 26.

The control circuit has a telephone section 28 to which the call signal is selectively transmitted through the rod antenna 29a of the panel 20 or an antenna 40 provided on the automobile through a changeover switch 28a. Namely, the changeover switch 28a is controlled by the microcomputer 25 so as to be operated to connect the telephone section 28 with the antenna 29a or with the antenna 40 through terminals 21e and 12e and an external input terminal 39. The call signal is applied to the system microcomputer 30 through terminals 21f and 12f.

The telephone section 28 is also selectively connected through a changeover switch 28b to the speaker 53 of the panel 20 through an amplifier 28d and to the speaker 36 provided in the automobile through the source changeover section 32. The telephone section 28 is further connected through a changeover switch 28c to the microphone 51 through an amplifier 28e and to a microphone 38 mounted in the body 10 through terminals 21g, 12g, and an external input terminal 37. The changeover switches 28b and 28c are controlled by the microcomputer 25 so that the telephone can be used either with the panel in user's hand or attached to the body 10. The power is supplied to the amplifiers 28d and 28e and the display driver 23 from the battery 27.

The operation of the present invention is described hereinafter.

In order to use the telephone from the automobile, the panel 20 may either be attached to or detached from the car stereo body 10. When the system microcomputer 30 in the body 10 detects that the panel is attached in accordance with the operation of the detector switch 15, the microcomputer 30 supplies data to the microcomputer 25 in the panel 20 through the terminals 12h and 21h. Meanwhile, the microcomputer 25 is connected with the stabilized power supply 41 through the battery 27. The microcomputer 25 operates the changeover switches 28a, 28b, and 28c to connect the telephone section 28 with the antenna 40, speaker 36 and the microphone 38, respectively. When a call button (not shown) provided on the panel 20 is depressed, or the operation buttons 22 are operated to input a predetermined code, the telephone section 28 is rendered operative. When a dial tone is heard over the speaker 36, the operation buttons 22 are operated to call a desired number. Thus the conversation is carried out through the microphone 38 and the speaker 36.

The telephone call can also be made from the automobile with the panel detached. Upon detecting that the panel 20 is detached from the car stereo body 10, the system microcomputer 30 stops supplying data to the microcomputer 25. The microcomputer 25 is then supplied with the power charged in the battery 27. The microcomputer 25 operates the changeover switches 28a, 28b and 28c to connect the telephone section 28 with the antenna 29a, the speaker 53 and the microphone 51, respectively, as shown in FIG. 3. The call button (not shown) is operated to render the panel in a phone mode. The dial tone is heard through the speaker 53, and the user opens the lid 50 and operates the push buttons 52 to make a call. Hence, the conversation over the

telephone is carried out through the speaker 53 and the microphone 51.

When a call signal is applied from an outside telephone to the telephone section 28 through the antenna 40, the call signal is fed to the system microcomputer 30. The system microcomputer 30 accordingly operates the volume controller 33 to mute the sound of whatever is being played on the car stereo. Thus, when the panel is detached, and the call button is depressed to answer the call, a conversation can be carried out without the sound from the car stereo interfering.

When leaving the vehicle, the driver detaches the panel 20 from the car stereo body 10 and takes it with him. The driver can use the panel 20 as a portable telephone in the same manner as described above outside of the automobile. Without the panel 20, it becomes difficult to recognize the car stereo. Hence the theft of the car stereo can be prevented. Furthermore, since there is a use for the panel 20, the driver is likely to take the trouble of carrying the panel.

The car stereo of the present invention is further provided with a system for rendering the car stereo inoperative when actually stolen, the operation of which is described hereinafter with reference to FIGS. 4a and 4b.

When the owner neglects to take the panel with him when leaving the automobile, the car stereo may be stolen with the panel. In such a case, the owner calls the telephone in his car stereo from a pay phone or from a home phone. When a call signal is applied to the system microcomputer 30 through the antenna 40 and the telephone section 28, a counter provided in the system microcomputer 30 is cleared at a step 101. With the first ringing tone at a step 102, a timer provided in the system microcomputer 30 is cleared at a step 103. The counter is count up at a step 104 and the timer is started at a step 105. The steps 102 to 105 is repeated until it is detected at steps 106 to 108 that the present time T measured by the timer has reached a predetermined time t or the count N of the counter representing the number of the ringing tone has reached a predetermined number n, or the ringing tone has stopped. More particularly, the owner keeps ringing the telephone in the car stereo n times within the time t. Thereafter, the program goes to a step 109 where the timer is stopped and to a step 110 where the counter is cleared.

At a step 111, the system microcomputer 30 in the car stereo body 10 stops supplying data to the microcomputer 25 in the panel so that the car stereo cannot function even though the operation buttons 22 are operated. At the same time, the telephone is rendered inoperative.

If the thief picks up the panel 20 in response to the ringing tone after the timer is started at the step 105, the program goes from a step 115 where it is determined that the line is connected, to a step 119. The owner calling from the outside line consecutively operates push buttons or a dial to apply a predetermined code to the system microcomputer 30 through the telephone section 28. The code is assigned to the car stereo and stored in a ROM in the system microcomputer. When it is determined that a code is applied to the system microcomputer 30 at the step 119, the applied code is compared with a code stored in the ROM which is stored when the car stereo is manufactured, or compared with a code in a RAM of the system microcomputer 30 which is stored by the owner. When the codes coincide with each other (step 120), the program goes to the step 111 where the car stereo and the telephone are rendered inoperative.

If the ringing tone is continued for the predetermined long time t, the program goes from the step 106 to a step 116 where the timer is stopped. The counter is cleared at a step

117. When the line is connected by this time (step 118), the owner operates the buttons of the telephone which he is using to input the predetermined code. Thereafter, the program proceeds from the step 118 to the steps 119, 120 and 111 as described hereinbefore.

When the line is kept disconnected after the time t, the program goes from the step 118 to a step 121 where it is determined that the ringing tone is stopped. Thereafter, the program goes to a step 122 where the car stereo returned to the normal operation state.

In order to render the car stereo and the telephone operative after the car stereo is restored to the owner, the operation buttons 22 on the panel 20 are consecutively operated to input a predetermined code which is assigned to each stereo as an identification code and stored in the ROM of the system microcomputer 30. The code may be stored in the RAM of the system microcomputer 30 by the owner. Therefore, at a step 112, it is determined that code is applied to the microcomputer 30. Thereafter, the input code is compared with the code stored in the ROM or the RAM at a step 113. When the codes coincide, program goes to a step 114 where the telecommunication system of the panel 20 is restored and to the step 122 where the operation of the car stereo is resumed.

The car stereo may be provided with other transmitting devices such as a radio transmitter instead of the telephone.

The anti-theft system may be modified so as to indicate a warning on the display 23 of the panel 20, or to keep on generating a large alarm sound by operating the panel, when the code for rendering the car stereo inoperative is transmitted. Alternatively, the microcomputer 25 of the panel 20 may be operated to contact the police.

Furthermore, a voice signal may be used instead of the code. In order to render the car stereo inoperative, the owner pronounces a word or a code corresponding to the stored voice signal which is fed to the voice recognizing section 31 provided in the car stereo body 10. When the voice recognizing section 31 recognizes the word or code, the system microcomputer 30 is operated to stop the operation of the car stereo and the telephone. The voice recognizing section 31 may be provided in the panel 20.

In the second embodiment of the present invention, the push buttons 52 provided on the panel 20 is omitted as shown in FIG. 5, so that the telephone is used by operating the buttons 22. Moreover the display 23 is operated to indicate appropriate data when in the phone mode.

The operation with the buttons 22 is described hereinafter with reference to FIG. 6. When an ignition key of the automobile is turned to the accessory (ACC) position, the program goes from a step 1201 to a step 1202 where the operation of the operation buttons 22 is in a car stereo mode. When the panel 20 is detached from the car stereo body 10 at a step 1203, the volume controller 33 (FIG. 3) in the car stereo body 10 is operated to mute the audio signals applied from either the tuner, CD player or the cassette player at a step 1204, so that a conversation may be easily heard over the telephone. Thereafter, the mode of the operation buttons 22 are changed into a phone mode at a step 1205. The buttons 22 or the call button of the panel 20 is depressed to operate the telephone section 28 in the panel, and the buttons 22 is operated to call a desired number, thereby enabling to use the panel 20 as a telephone.

The phone mode is maintained until a step 1206 determines that the panel 20 is attached to the car stereo body 10. Thereafter, muting of the audio signals is revoked at a step 1207. The program returns to the steps 1201 and 1202 so that the push buttons are again in the car stereo mode.

On the other hand, if it is determined at the step 1203 that the panel 20 is attached, and at a step 1208 that a call signal is transmitted, the audio signals are muted at a step 1209. When the call is answered by picking up the panel 20 and depressing the call button, the program proceeds from a step 1210 to the step 1205, where the buttons 22 are rendered in the phone mode. When there is no call signal, the program returns from the step 1208 to the step 1201.

When the ignition key is not turned to the ACC position, the car stereo is inoperative and the telephone can be used only to make a call. The program proceeds from the step 1201 to a step 1211 where it is determined whether the panel 20 is attached to the car stereo body 10. When the panel is detached for making a call, the buttons 22 on the panel are operated in the phone mode (step 1212) until the panel is attached (step 1213). Whenever the panel 20 is attached to the body 10, the program returns to the step 1201 from the step 1211 or from the step 1213.

FIG. 7 shows the operation for setting the operation mode of the display 23. At the start of the operation, the display 23 is turned off. When the ignition key is turned to the ACC position, the program goes from a step 1301 to a step 1302 where the display 23 is operated to be in a car stereo mode, thereby indicating such information as the received frequency as shown in FIG. 8. When there is a call (step 1304) while the panel 20 is kept attached (step 1303), the display 23 flashes letters "CALL" as shown in FIG. 9 (step 1305). When the panel 20 is detached from the car stereo body 10 to take the call, the operation of the display 23 is changed to a phone mode (step 1307). When the conversation over the telephone is finished so that the panel 20 is attached to the body 10 (step 1308), the program returns to the step 1301.

When it is determined at the step 1303 that the panel 20 is detached in order to make a call from the automobile, the program goes to a step 1310 where the operation of the display 23 is changed to the phone mode. When the operation buttons 22 are pushed to call a desired number, the number is indicated on the display 23 as shown in FIG. 10. After the panel 20 is attached at a step 1311, the program returns to the step 1301.

When the ignition key is not operated, the program goes from the step 1301 to a step 1309 to determine the condition of the panel 20. If the panel is detached, the display 23 is in the phone mode, thereby allowing to make a phone call. Whenever the panel 20 is attached, the program returns from steps 1308, 1309 and 1311 to the step 1301 and to the step 1302, thereby maintaining the display 23 in the car stereo mode until the panel 20 is detached.

Namely, in the present embodiment, the panel 20 attached to the body 10 can receive a call provided the ignition key is at ACC position. On the other hand, in order to make a call, the panel 20 must be detached from the body 10. The operation for rendering the car stereo and the telephone inoperative is the same as in the first embodiment.

FIGS. 11 to 15 show various modifications of the car stereo. In the car stereo shown in FIGS. 11 to 13, the cassette opening 14 is formed at the upper left hand corner of the front panel 11. The panel 20 is so cut away in a shape that the opening 14 is kept apparent when the panel 20 is attached to the car stereo body 10. As shown in FIGS. 12 and 13 the connector 12 of the car stereo body 10 is disposed in a recess 12A and the connector 21 is disposed in a projection 21A where the microphone 53 is also provided. Other constructions and the operations are roughly the same as the second embodiment.

Referring to FIG. 14, a component car stereo system is provided with an equalizer 10A having a spectrum analyzer

display 10B. The panel 20 is attached to a recessed panel 11 under the equalizer 10A.

From the foregoing it will be understood that the present invention provides a car stereo having a removable panel where the panel can be used as a portable cellular telephone. Thus the mounting operation is simplified than when independently mounting both the car stereo and the telephone. In addition, since the telephone can be used outside of the automobile, the owner will be likely to carry the panel when leaving the automobile, thereby reducing the possibility of the theft. Furthermore, since the car stereo can be rendered inoperative when actually stole, the theft is further prevented.

While the presently preferred embodiments of the present invention have been shown and described, it is to be understood that these disclosures are for the purpose of illustration and that various changes and modifications may be made without departing from the scope of the invention as set forth in the appended claims.

What is claimed is:

1. A car stereo having a removable panel attached to a body of the car stereo provided in an automobile, the panel having a plurality of operation buttons for selecting a frequency received by the car stereo, the car stereo comprising:

a radio telephone system provided in the panel, the radio telephone system having an antenna and a telephone section;

a battery provided in the panel for operating the radio telephone system; and

control means, provided in one of the car stereo body and the panel, for rendering the car stereo into a disabled state in response to an instruction received through the radio telephone system, in the disabled state the car stereo cannot be operated even though the operation buttons are operated therein preventing theft of the car stereo.

2. The car stereo according to claim 1 wherein

the radio telephone system is operated through the operation buttons of the panel.

3. The car stereo according to claim 1 wherein

the panel has a display for displaying conditions of the car stereo, the panel has a display driver for displaying operation of the radio telephone.

4. The car stereo according to claim 1 further comprising a detector means for detecting removing the panel, and operating means responsive to the detected removal of the panel for rendering the telephone system operative.

5. The car stereo according to claim 1 further comprising muting means responsive to a received telephone call for muting sound of the car stereo.

6. A car stereo having a removable panel attached to a body of the car stereo provided in an automobile, the panel having a plurality of operation buttons for selecting a frequency received by the car stereo, the car stereo comprising:

a radio telephone system provided in the panel, the radio telephone system having an antenna and a telephone section;

the plurality of operation buttons for selecting a frequency received by the car stereo to be used as push buttons for the radio telephone system;

a battery provided in the panel for operating the radio telephone system; and

control means, provided in one of the car stereo body and the panel, for rendering the car stereo into a disabled

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state in response to an instruction received through the radio telephone system, in the disabled state the car stereo cannot be operated even though the operation buttons are operated therein preventing theft of the car stereo.

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7. A car stereo according to claim 1, wherein said plurality of operation buttons for selecting a frequency received by the car stereo are also used as push buttons for the radio telephone system.

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United States Patent [19]**Oberlaender**[11] **Patent Number:** **6,160,997**[45] **Date of Patent:** **Dec. 12, 2000**[54] **RADIO RECEIVER**[75] **Inventor:** **Ralf Oberlaender, Hildesheim, Germany**[73] **Assignee:** **Robert Bosch GmbH, Stuttgart, Germany**[21] **Appl. No.:** **08/878,414**[22] **Filed:** **Jun. 18, 1997**[30] **Foreign Application Priority Data**

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[51] **Int. Cl.⁷** **H04B 7/00; H04B 1/38; H04B 1/00**[52] **U.S. Cl.** **455/66; 455/550; 455/556; 379/110.01**[58] **Field of Search** **455/66, 344, 345, 455/346, 130, 550, 556, 558, 575, 564, 565; 379/110.01, 447, 428, 419**[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Reinhard J. Eisenzopf**Assistant Examiner**—Charles N. Appiah**Attorney, Agent, or Firm**—Fulbright & Jaworski, LLP[57] **ABSTRACT**

A radio receiver is proposed where a multifunctional 10-digit keypad (1) is provided for the input of information. The radio receiver comprises a receiver component, a display device (75) and keys for the input of information, where the keys are in part configured as a 10-digit keypad (1). In addition, the radio receiver comprises a telephone device. A selection key (5) is provided for switching between telephone operating mode and radio receiver operating mode. An input in the 10-digit keypad (1) during radio operation directly selects the frequency to be tuned in and/or recalls a station key. A frequency input in the 10-digit keypad (1) is preferably indicated by actuating the "0" key (20) of the 10-digit keypad (1) prior to inputting the frequency. An input in the 10-digit keypad (1) in telephone operation mode selects a telephone number. An input in the 10-digit keypad (1) in telephone operation mode can also retrieve a memory location in the speed dial memory. Several alphanumeric and/or special characters are assigned to each of keys (11, 12, . . . , 19) of the 10-digit keypad (1) where the desired character is selectable by a single or multiple actuation of the respective key (11, 12, . . . , 19). At least one key (10, 45) is provided for the switching of the 10-digit keypad (1) between alphanumeric and numeric input.

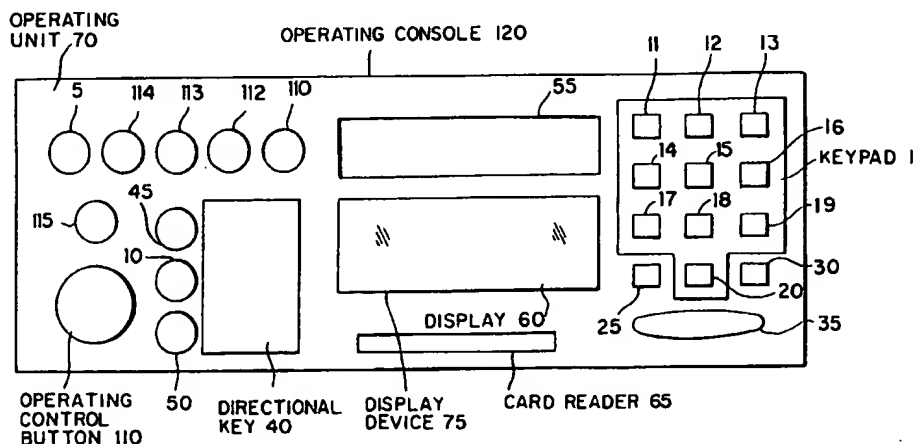
58 Claims, 2 Drawing Sheets

FIG. 1

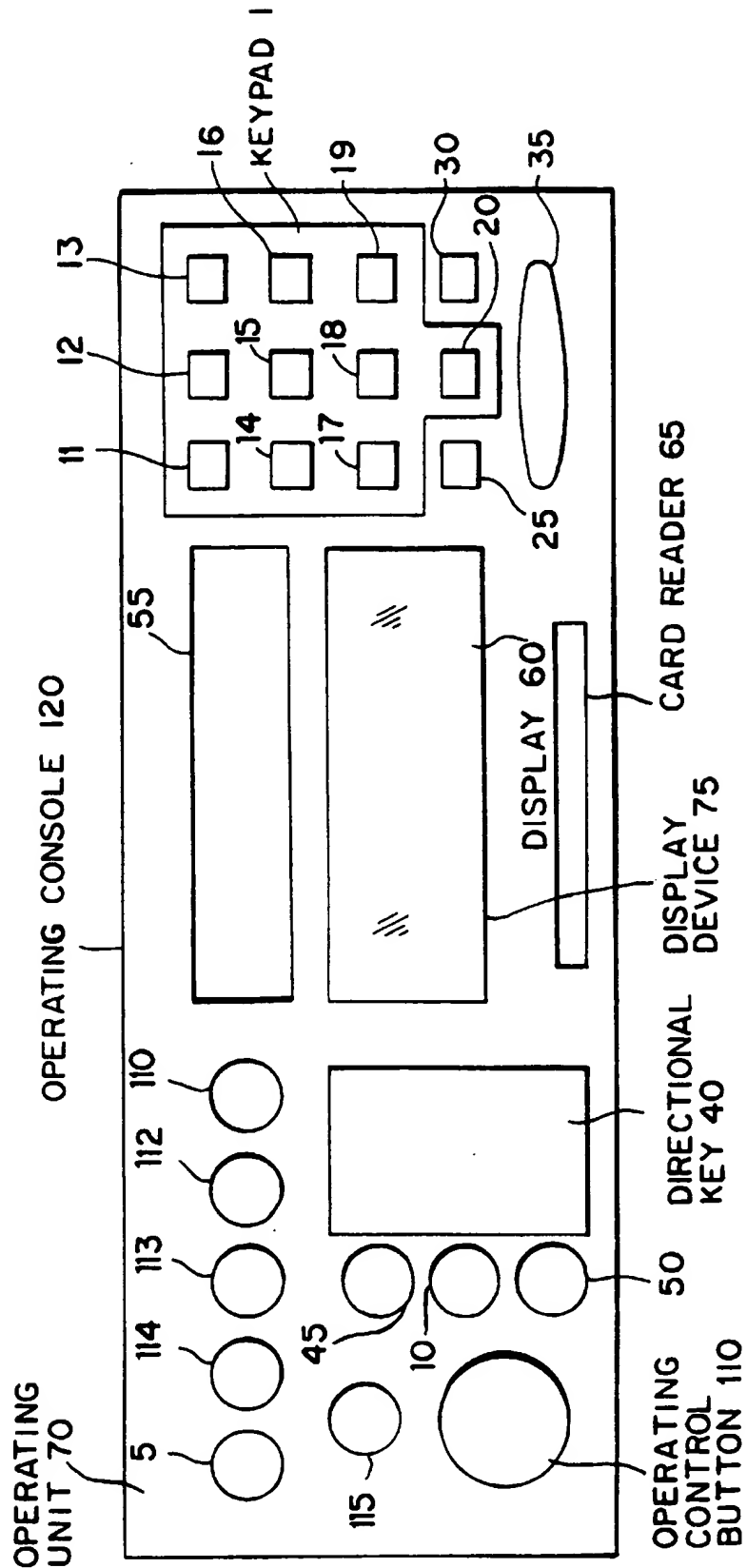
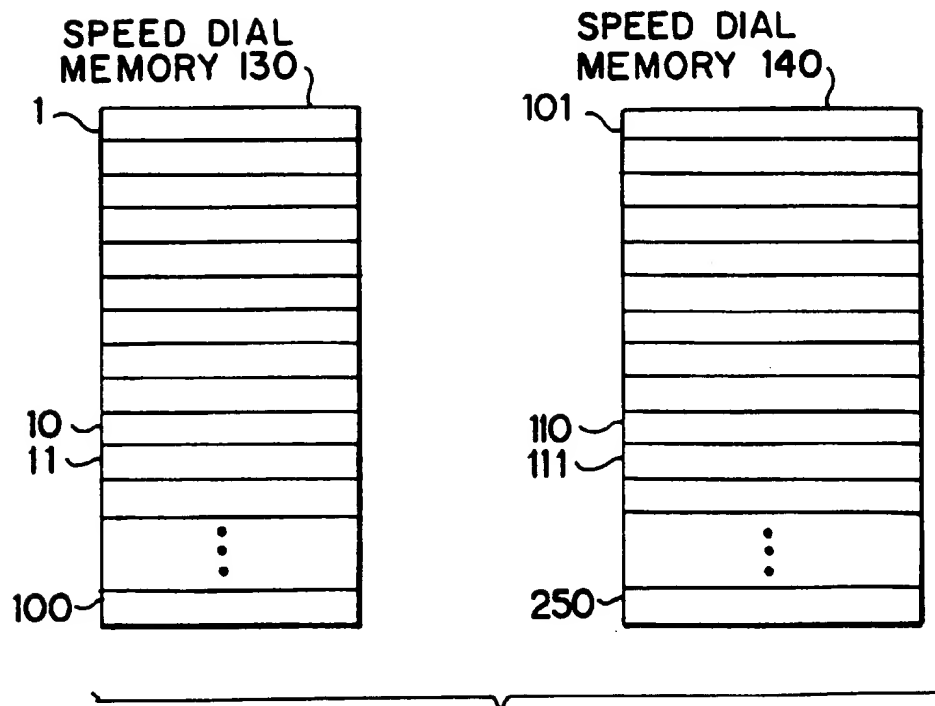
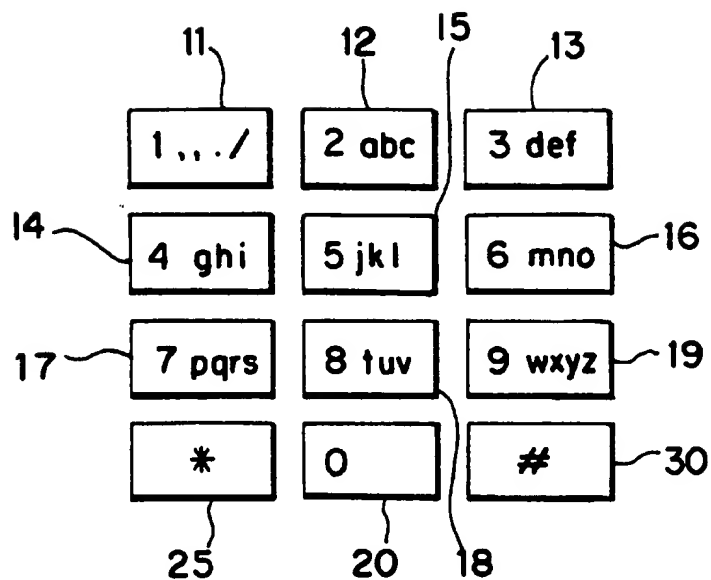


FIG. 2

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RADIO RECEIVER**PRIOR ART**

The invention is based on a radio receiver of the kind described in the main claim.

From DE 42 30 912 A1 a radio receiver is known with a receiver component, a display device and keys for the input of information, where the keys are configured in a 10-digit keypad. In addition, the radio receiver also has a memory in which numbers are assigned to the radio stations that can be received. The numbers are in a fixed relation to specific letters of the alphabet with no more than three letters assigned to each number of the 10-digit keypad. Upon selection of a number combination in the radio receiver, the desired station is tuned in according to the input.

ADVANTAGES OF THE INVENTION

In contrast, the radio receiver according to the invention with the features of the main claim, has the advantage that the 10-digit keypad can be used both in the operation of a radio and of a telephone. In this way operating elements are eliminated so that a simpler and easier operation of the receiver is possible. In addition, the reduction of operating elements positively affects production costs.

Moreover, it is advantageous that a more direct input of the desired frequency is possible by means of the 10-digit keypad. In this way it is possible to quickly access a known frequency or one that was just read, such as for example on an advisory highway sign, without having to initiate the "seek" function.

It should also be seen as an additional advantage that in radio reception mode the 10-digit keypad itself can be used multifunctionally and can serve both for the direct selection of the desired frequency and to call up pre-selected stations. Additional operating elements are saved in this way and neatness of layout is improved even more.

The measures listed in the subclaims make possible further advantageous embodiments and improvements of the radio receiver disclosed in the main claim.

Especially advantageous is the use of the 10-digit keypad for selecting memory locations of a speed dialer. In this manner, the functionality of the 10-digit keypad is extended even when used in telephone mode, which again saves operating elements and improves the layout for ease of operation by the user.

Particularly advantageous is the use of the radio receiver display device for displaying the contents of the speed dialer, whereby a memory location is selected by means of a directional key. In this way a multiple use of the indicator device takes place both in radio as well as telephone operation, which also increases ease of operating the unit and reduces the cost of operating elements.

In addition, it should be seen as an advantage that when the radio receiver is equipped with a cassette tape player and a compact disc player or compact disc changer, the 10-digit keypad can be used to operate these components as well. In this case as well, the expanded functionality of the 10-digit keypad produces an improvement of ease of operation and savings of production costs, because separate operating elements need not be provided for each component.

An advantageous improvement of operating comfort also results from the fact that each key of the 10-digit keypad is assigned several alphanumeric and/or special characters, whereby the naming of stations is possible by means of the 10-digit keypad during radio use, of speed dial locations

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during telephone use and of compact discs during compact disc or compact disc changer use. The input of a message for transmission during telephone unit operation is also possible. Finally, these measures permit a realization of maximal ease of overview, with a minimal use of operating elements and space requirements. This improvement of operating ease allows to minimize the impairment of driving safety during car radio use when the radio receiver is used as a car radio.

THE DRAWING

An exemplary embodiment of the invention is shown in the drawing and is explained in more detail in the following description. There are shown

in FIG. 1, an operating unit of the radio receiver according to the invention,

in FIG. 2 an expanded 10-digit keypad and

in FIG. 3 the breakdown of a speed dial memory in a memory chip of a telephone card and in a memory of a radio receiver.

DESCRIPTION OF THE EXEMPLARY EMBODIMENT

The radio receiver according to the invention is configured here as a car radio. The functions of the radio receiver can be activated by a key combination in an operating unit 70 according to FIG. 1. A display device 75 providing user information and operating instructions is linked with the operating unit 70. In addition, the car radio includes a telephone device, a radio receiver part, a cassette tape drive, a compact disc player configured as a compact disc changer, and a memory which stores speed dial locations for telephone use and memory locations for radio station keys, radio station names and names for compact discs. In addition, the memory 85 contains additional information for the operation of the radio receiver, such as for example sound and volume settings and access authorization codes for one or more users. The operating unit 70 and display device 75 are located together in the operating console 120.

FIG. 1 shows the operating console 120 of the radio receiver, wherein 1 designates a 10-digit keypad having 10 numeric keys 11, 12, . . . , 20. FIG. 2 shows the assignment of the individual keys. Accordingly, reference No. 11 refers to the first key of the 10-digit keypad 1 for entering a "1," reference No. 12 to the second key of the 10-digit keypad 1 for entering a "2," reference No. 13 to the third key of the 10-digit keypad 1 for entering a "3," reference No. 14 to the fourth key of the 10-digit keypad 1 for entering a "4," reference No. 15 to the fifth key of the 10-digit keypad 1 for entering a "5," reference No. 16 to the sixth key of the 10-digit keypad 1 for entering a "6," reference No. 17 to the seventh key of the 10-digit keypad 1 for entering a "7," reference No. 18 to the eighth key of the 10-digit keypad 1 for entering an "8," reference No. 19 to the ninth key of the 10-digit keypad 1 for entering a "9," reference No. 20 to the tenth key of the 10-digit keypad 1 for entering a "0." Additionally, the first nine keys 11, 12, . . . , 19 of the 10-digit keypad have also assigned to them alphanumeric and special characters. Thus, the first key 11 of the 10-digit keypad 1 has assigned to it a comma, a semicolon, a period and a slash. The second key 12 of the 10-digit keypad 1 has assigned to it the letters a, b and c, the third key 13 of the 10-digit keypad 1 has assigned to it the letters d, e and f, the fourth key 14 of the 10-digit keypad 1 has assigned to it the letters g, h and i, the fifth key 15 of the 10-digit keypad 1 has assigned to it the letters j, k and l, the sixth key 16 of the

10-digit keypad 1 has assigned to it the letters m, n and o, the seventh key 17 of the 10-digit keypad 1 has assigned to it the letters p, q, r and s, the eighth key 18 of the 10-digit keypad 1 has assigned to it the letters t, u and v, and the ninth key 19 of the 10-digit keypad 1 has assigned to it the letters w, x, y and z. In addition, two non-numeric auxiliary keys 25 and 30 are arranged in the 10-digit keypad 1, of which the first non-numeric auxiliary key 25 is the "star" key and the second non-numeric auxiliary key 30 is the "pound" key as they are known from telephone keypads. Both non-numeric auxiliary keys 25 and 30 are also shown in FIG. 2.

Pressing the call key 35 in FIG. 1 activates the automatic dialing of a telephone number stored in one of the selected memory locations of the speed dialer memory. Reference 55 designates the cassette slot of a cassette tape player, reference 60 designates a display of the display device 75 which, together with operating unit 70, forms the operating console 120. Reference 65 designates a card reader for the input of an access authorization and/or a telephone card. Reference 110 designates the volume control button of the radio receiver, which button also operates the on/off function. Reference 115 designates a sound adjustment key, 114 a traffic report station key, 113 a the automatic station search key, 112 a noise suppression key and 111 a cassette forward and reverse function key. A menu key 45 lets the selection menu be displayed in the display 60. In addition, a memory key 10 is provided through which memory locations in the memory can be retrieved and displayed in the display 60 by the display device 75. A directional key 40 serves for the selection of menu items or memory locations in the display 60 by allowing a cursor movement up, down, left and right in the display 60. In addition the key 40 is designed as a tilt switch with a vertical and a horizontal tilt axis. A "cancel" key 50 permits cancellation of entries in the display 60. A "select" key 5 permits switching between the telephone device, the radio receiver device, the cassette tape player and the compact disc player.

Below are described in more detail the possible inputs in the operating console 120 shown in FIG. 1. Having switched to the radio receiver operation mode by using the "select" key 5, the keys 11, 12, . . . , 20 of the 10-digit keypad can be used as station keys so that use of at least one of these keys results in selection of the corresponding memory location in the memory so that subsequently the station stored there in form of frequency information can be tuned by the radio receiver. However, a direct selection of a desired frequency is also possible by using the 10-digit keypad 1 so that the selected frequency can be tuned in by the radio receiver without a preceding memory search. A "0" is to be selected to differentiate between an input of station keys and the frequency selection before selecting a frequency by using the tenth key 20 of the 10-digit keypad 1. That means of course, that the tenth key 20 of the 10-digit keypad 1 can only be used as a station key in connection with a preceding selection of another key 11, 12, . . . , 19 of the 10-digit keypad 1.

Having switched from the radio receiver to the telephone function by using key 5, the 10-digit keypad 1 and the non-numeric auxiliary keys 25 and 30 allocated to it, as well as the "call" key 35, can be used as a common telephone keypad for the selection of, for example, a telephone number. Moreover, there is the possibility to retrieve a memory location of a speed dialer by an input in the 10-digit keypad 1. In this context, the speed dialer is either located completely within the memory or both in the memory and in the memory chip of a telephone card inserted into the card reader 65. It would be possible to locate the speed dialer

completely in the memory chip of a telephone card inserted into the card reader 65 so that no speed dialer would be needed in the memory. In the example described here, the speed dialer is to be located both in the memory and in the memory chip of a telephone card inserted into the card reader 65. Several possibilities are provided for retrieval of a memory location of the speed dialer. For one, there is the possibility of speed dialing. When speed dialing, nine different memory locations can be retrieved from the memory, as well as nine different locations from the memory chip of a telephone card inserted into the card reader 65. Therefore, only one key of the 10-digit keypad 1 needs to be actuated. To specify the retrieval of a memory location in the speed dial memory by means of speed selection, the appropriate key must be actuated for a first predetermined length of time, for example for more than two seconds. Upon actuation of the appropriate key in the 10-digit keypad 1, an automatic selection of the telephone number stored in the selected memory location takes place. If the speed selection of a memory location is to take place in the speed dialer of a memory chip in a telephone card inserted into the card reader 65, then before the actuation of the appropriate key in the 10-digit keypad 1 the first non-numeric auxiliary key 25 needs to be actuated. Subsequently, the appropriate key of the 10-digit keypad 1 is again actuated for a first predetermined length of time. Once the appropriate key of the 10-digit keypad 1 has been actuated, the telephone number stored in the selected location of the memory chip in the telephone card is automatically dialed. Due to the definition of speed selection for speed dial memory location in the memory chip of the telephone card by the preceding actuation of the first non-numeric auxiliary key 25, the provision can be made not to provide the time delay for the operation of the appropriate key in the 10-digit keypad 1. Instead of the first non-numeric auxiliary key 25, it can also be provided of course that the second non-numeric auxiliary key 30 be used for initiating the described speed dialing.

The embodiment described here permits a selection of a total of 250 speed dial locations by taking into account the speed dial location included in the memory chip of the telephone card inserted in the card reader 65. Memory locations 1 through 100 are stored in the speed dial memory 130 of the telephone card according to FIG. 3. Memory locations 101 through 250 are stored in the speed dial memory 140 of the memory which can also be seen in FIG. 3. Thus speed selection allows access to memory locations 1 through 9 of the speed dial memory 130 in the telephone card and the speed dial locations 101 through 109 of the speed dial memory 140 in the memory. Memory locations 10 through 100 of the telephone card memory speed dial memory 130 and the memory locations 110 through 250 of the speed dial memory 140 in the memory are not accessible by speed selection but require for an activation the actuating of the memory key 10, which displays the content of both speed dial memories 130 and 140 in the display 60 of the display device 75. A selection of a memory locations is then effected by actuating the directional key 40, which allows the cursor to run through both speed dial memories, starting from a low-numbered memory location, to a high one and vice versa. An alphabetic run through the speed dial memories 130 and 140 is possible as well. A selection of a memory location can take place by selecting the number of the memory location in the 10-digit keypad 1. At such a selection the cursor jumps to the number of the selected memory location. Since not all memory location numbers and their respective memory location contents can be displayed simultaneously in the display 60 of the display device 75,

only the section within the area of the cursor is displayed. If the "call" key 35 is actuated, the telephone number stored in the selected memory location and marked by the cursor, is automatically selected.

"Select" key 5 also serves for the selection of the cassette player and the compact disc changer. Repeated actuation of the "select" key 5 permits switching between the desired operating mode or the desired component. When the cassette player is in use, an input in the 10-digit keypad 1 results in a direct title selection in a cassette inserted in the player. An activation of the desired title occurs once a second predetermined time period has elapsed from the time of input in the 10-digit keypad 1. That means that in case of two-digit or multiple-digit inputs in the 10-digit keypad 1 the time period between the inputs of two consecutive numbers must be shorter than the second predetermined time period. In order to avoid this, another demarkation of two-digit or multiple digit numbers is also possible. For example, a two-digit or a multiple-digit input can be initiated and terminated by actuating the two non-numeric auxiliary keys 25 and 30, so that the activation of the selected title does not take place until after the second actuation of the appropriate non-numeric auxiliary key 25, 30.

During the compact disc player or compact disc changer operation a direct title selection is possible in the same manner as during the cassette tape player operation. If the compact disc player is configured as a compact disc changer as described in the exemplary embodiment, a direct selection of a disc located in the compact disc changer can be executed by means of an input in the 10-digit keypad 1. Common compact disc changers allow a selection of ten different compact discs, so that a simple input is sufficient to select the desired compact disc. The identification of a compact disc selection requires that the appropriate key of the 10-digit keypad 1 be actuated for a third predetermined length of time, for example for 1 second. If more than ten compact discs are stored and are accessible in the compact disc changer, it is again possible to use the described solution for the purpose of title selection through the use of one of the two non-numeric keys 25 and 30 in the 10-digit keypad 1. For example, to differentiate between two-digit or multiple-digit title selections or two-digit or multiple-digit compact disc selections, different non-numeric auxiliary keys can be used, i.e., the first non-numeric auxiliary key 25 for the title selection and the second non-numeric auxiliary key 30 for the compact disc selection; or, by actuating the same non-numeric auxiliary key 25, 30 for at least a fourth predetermined length of time after the input of the two-digit or multiple-digit number, for the selection of a compact disc.

As described previously, each of the keys of the 10-digit keypad 1 has assigned to it several alphanumeric and special characters. If, during radio receiver operation, the menu key 45 is actuated, the 10-digit keypad 1 switches to alphanumeric input. In this way it is possible to give a name to the radio station currently being received. This name will then appear in the display 60 every time that station is retrieved. Naming of the station takes place through sequential input of alphanumeric and/or special characters, whereby the alphanumeric and/or special characters are inputted as follows: when actuating the keys 12, 13, 14, 15, 16 and 18 of the 10-digit keypad 1, each of which have assigned to them three letters, the first actuation of the key selects the first letter, the second actuation the second letter, the third actuation the third letter and the fourth actuation the number of the corresponding key. Additional actuation of the appropriate key periodically repeats the sequence of characters. Activation of the characters on keys 11, 17 and 19 of the

10-digit keypad 1, which have assigned to them four letters and/or special characters, takes place correspondingly whereby the sequence consists of five instead of four characters.

If the menu key 45 is actuated during compact disc player or compact disc changer operation, then the 10-digit keypad 1 is likewise switched to the alphanumeric input and the disc being played can be named in any desired fashion. This name will then appear in the display 60 every time the disc is played. The naming occurs by sequentially inputting letters according to the above description of the naming of radio stations. Another actuation of the menu key 45 completes the naming of the station or the compact disc and the 10-digit keypad 1 is again switched to the numeric input. In a further embodiment example, an actuation of the menu key 45 causes the display 60 to display a menu interface with a "Radio Station Name" option or a "Compact Disc Name" option. The desired option can be selected by using the directional key 40 and another actuation of the menu key 45. This results in a switching to the desired operating mode without having to actuate the "select" key 5. When the naming process is complete and the menu key 45 is subsequently actuated, the function first switches to the next menu level with the two menu options, which can then be closed by actuating the "cancel" key 50. Simultaneously with the actuation of the "cancel" key 50 the 10-digit keypad 1 switches to the numeric input mode.

An additional functionality of the "store" key 10 is provided for the naming of speed dial locations. Thus, if the "store" key 10 is actuated during telephone operation, a selection menu appears first in the display 60. It contains the option of displaying the speed dial memory alphabetically or in numeric order, the option to transmit brief messages through the telephone device, and the option to create new speed dial locations and optionally at the same time to overwrite existing speed dial locations. The selection of the first two described options occurs by means of the directional key 40 and/or by means of numeric input in the 10-digit keypad 1, as previously described. The options are selected by means of the directional key 40 and activated by means of another actuation of the "store" key 10. If the "create new speed dial location" option is selected, then by activating this option through actuation of the "store" key 10 the 10-digit keypad 1 is simultaneously switched to alphanumeric input. The desired memory location is then selected by means of the directional key 40 and is overwritten by the speed dial choice; the speed dial choice can contain both the telephone number and the name of the person associated with that telephone number. Actuation of the "store" key 10 then stores the altered memory location in the memory and the quits the menu option. Simultaneously, the 10-digit keypad 1 is again switched to numeric input. Display 60 again displays the next menu level with the four abovementioned options, which can be canceled by actuating the "cancel" key 50. If the third option is selected, i.e., for the input of messages to be transmitted in telephone operation and the "store" key 10 is actuated, the 10-digit keypad 1 also switches to alphanumeric input. Appropriate input of alphanumeric and/or special characters in the 10-digit keypad 1 lets a message to be composed. That message will then be displayed in display 60 of the display device 75 in the same manner as when naming radio stations, compact discs or speed dial locations. Deletion of alphanumeric and/or special characters is possible in all described instances by marking the entry to be deleted using the directional key 40 and deleting the entry by actuating the "delete" key 50. In all described instances the alphanumeric input of letters and/or

special characters takes place by a single or multiple actuation of the appropriate key in the 10-digit keypad 1, as described in the section regarding the naming of radio stations. The "store" key 10 is actuated after a message to be transmitted is inputted in the display 60. This switches the 10-digit keypad 1 back to numeric input. Simultaneously, the message is stored in the memory. The menu can then be quitted in the manner described above in reference to the naming of speed dial memory location. If a telephone number is thereupon entered in the 10-digit keypad 1, the message stored in the memory is sent via the telephone device to the party whose number was dialed. Whenever a new message is entered, the old message stored in the memory is overwritten by the current message.

What is claimed is:

1. Radio broadcast receiver comprising a broadcast receiving part and keys for the entry of information, the keys being configured partially as a 10-key keyboard, a telephone system and a selector key for switching between telephone operation and broadcast receiving operation, wherein by an entry at the 10-key keyboard in broadcast receiving operation a direct entry of at least one of the groups comprising the frequency to be received or a call of station keys is performed, wherein the distinction of a frequency input at the ten-key keyboard is performed by an entry at the 10-key keyboard in telephone operation and a call of the memory location of a speed-dialing memory is performed, wherein for a given number of memory locations of the speed-dialing memory, a characterization of the call of at least one of these memory locations is performed by operating precisely one key of the 10-key keyboard at least for a first given time, wherein after operation of this key, an automatic dialing of the telephone number stored in the selected memory location is made and for the remaining memory locations of the speed-dialing memory a characterization of the call of one of these memory locations is performed by operating at least two keys.

2. Radio broadcast receiver according to claim 1, having at least one non-numerical auxiliary key which is associated with the 10-key keyboard, wherein a characterization of the call of at least one of the remaining memory locations of the speed dialing memory is performed by operating first the non-numerical auxiliary key and then operating one key of the 10-key keyboard for at least the first given time, such that after operation of the key of the 10-key keyboard an automatic selection of the call number stored in the chosen memory location takes place.

3. Radio broadcast receiver according to claim 2, whereby a memory key is provided such that by operation thereof the content of the speed dialing memory can be displayed on a display device of the radio broadcast receiver, wherein the selection of a memory location is performed by subsequent operation of at least one from the group comprising a direction key or an entry at the 10-key keyboard and a call key is provided, such that after operation of the call key an automatic selection of the telephone number stored in the selected memory location is performed.

4. Radio broadcast receiver according to claim 3 whereby a direct entry of the frequency to be received is made by an entry at the 10-key keyboard in radio broadcast receiving operation.

5. Radio broadcast receiver according to claim 4, wherein entry of a telephone number is performed by an entry at the 10-key keyboard in telephony operation.

6. Radio broadcast receiver according to claim 4, wherein the radio broadcast receiver comprises a cassette driving mechanism such that a changeover between cassette opera-

tion and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry in the 10-key keyboard in cassette operation, a direct title selection for a cassette situated in the cassette driving mechanism is performed.

7. Radio broadcast receiver according to claim 4, wherein the radio broadcast receiver comprises a compact disk player such that a changeover between compact disk operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry at the ten-key keyboard in compact disk operation, a direct title selection for a compact disk situated in the compact disk mechanism is performed.

8. Radio broadcast receiver according to claim 4, wherein the radio broadcast receiver is connected with a compact disk changer, a changeover between compact disk changer operation and other functions of the radio broadcast receiver is performed by the selector key, that by an entry at the 10-key keyboard in compact disk operation, at least one selection from the group comprising a direct selection of a compact disk situated in the compact disk changer or a direct title selection for a compact disk situated in the compact disk mechanism are performed, and wherein a characterization of the selection of a compact disk is performed by operating the corresponding key of the 10-key keyboard at least for an additional present time.

9. Radio broadcast receiver according to claim 4, wherein the keys of the 10-key keyboard there are associated with at least one of the following steps from the group comprising a plurality of alphanumerical signs or special signs, the desired sign being selectable by single or multiple operation of the corresponding key, and wherein at least one key is provided for switching the 10-key keyboard between alphanumerical entry and numerical entry.

10. Radio broadcast receiver according to claim 4, wherein by entry of alphanumerical signs at the 10-key keyboard in radio broadcast receiving operation a naming of at least one transmitter is performed.

11. Radio broadcast receiver according to claim 4, wherein by entry of alphanumerical signs at the 10-key keyboard in telephone operation, a naming of at least one speed-dialing memory location is performed.

12. Radio broadcast receiver according to claim 2 whereby a direct entry of the frequency to be received is made by an entry at the 10-key keyboard in radio broadcast receiving operation.

13. Radio broadcast receiver according to claim 12, wherein entry of a telephone number is performed by an entry at the 10-key keyboard in telephony operation.

14. Radio broadcast receiver according to claim 12, wherein the radio broadcast receiver comprises a cassette driving mechanism such that a changeover between cassette operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry in the 10-key keyboard in cassette operation, a direct title selection for a cassette situated in the cassette driving mechanism is performed.

15. Radio broadcast receiver according to claim 12, wherein the radio broadcast receiver comprises a compact disk player such that a changeover between compact disk operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by entry at the ten-key keyboard in compact disk operation, a direct title selection for a compact disk situated in the compact disk mechanism is performed.

16. Radio broadcast receiver according to claim 12, wherein the radio broadcast receiver is connected with a

compact disk changer, a changeover between compact disk changer operation and other functions of the radio broadcast receiver is performed by the selector key, that by an entry at the 10-key keyboard in compact disk operation, at least one selection from the group comprising a direct selection of a compact disk situated in the compact disk changer or a direct title selection for a compact disk situated in the compact disk mechanism are performed, and wherein a characterization of the selection of a compact disk is performed by operating the corresponding key of the 10-key keyboard at least for an additional present time.

17. Radio broadcast receiver according to claim 12, wherein the keys of the 10-key keyboard there are associated with at least one of the following steps from the group comprising a plurality of alphanumerical signs or special signs, the desired sign being selectable by single or multiple operation of the corresponding key and wherein at least one key is provided for switching the 10-key keyboard between alphanumerical entry and numerical entry.

18. Radio broadcast receiver according to claim 12, wherein by entry of alphanumerical signs at the 10-key keyboard in radio broadcast receiving operation a naming of at least one transmitter is performed.

19. Radio broadcast receiver according to claim 12, wherein by entry of alphanumerical signs at the 10-key keyboard in telephone operation, a naming of at least one speed-dialing memory location is performed.

20. Radio broadcast receiver according to claim 12, whereby the distinction of a frequency input at the 10-key keyboard is performed by operating the zero key of the 10-key keyboard before entering the frequency.

21. Radio broadcast receiver according to claim 1, whereby a memory key is provided such that by operation thereof the content of the speed dialing memory can be displayed on a display device of the radio broadcast receiver, wherein the selection of a memory location is performed by subsequent operation of at least one from the group comprising a direction key or an entry at the 10-key keyboard and a call key is provided, such that after operation of the call key an automatic selection of the telephone number stored in the selected memory location is performed.

22. Radio broadcast receiver according to claim 21 whereby a direct entry of the frequency to be received is made by an entry at the 10-key keyboard in radio broadcast receiving operation.

23. Radio broadcast receiver according to claim 22, wherein entry of a telephone number is performed by an entry at the 10-key keyboard in telephony operation.

24. Radio broadcast receiver according to claim 22, wherein the radio broadcast receiver comprises a cassette driving mechanism such that a changeover between cassette operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry in the 10-key keyboard in cassette operation, a direct title selection for a cassette situated in the cassette driving mechanism is performed.

25. Radio broadcast receiver according to claim 22, wherein the radio broadcast receiver is connected with a compact disk changer, a changeover between compact disk changer operation and other functions of the radio broadcast receiver is performed by the selector key, that by an entry at the 10-key keyboard in compact disk operation, at least one selection from the group comprising a direct selection of a compact disk situated in the compact disk changer or a direct title selection for a compact disk situated in the compact disk mechanism are performed, and wherein a characterization of the selection of a compact disk is performed by operating the

corresponding key of the 10-key keyboard at least for an additional present time.

26. Radio broadcast receiver according to claim 22, wherein the keys of the 10-key keyboard there are associated with at least one of the following steps from the group comprising a plurality of alphanumerical signs or special signs, the desired sign being selectable by single or multiple operation of the corresponding key and wherein at least one key is provided for switching the 10-key keyboard between alphanumerical entry and numerical entry.

27. Radio broadcast receiver according to claim 22, wherein by entry of alphanumerical signs at the 10-key keyboard in radio broadcast receiving operation a naming of at least one transmitter is performed.

28. Radio broadcast receiver according to claim 22, wherein by entry of alphanumerical signs at the 10-key keyboard in telephone operation, a naming of at least one speed-dialing memory location is performed.

29. Radio broadcast receiver according to claim 22, whereby the distinction of a frequency input at the 10-key keyboard is performed by operating the zero key of the 10-key keyboard before entering the frequency.

30. Radio broadcast receiver according to claim 22, wherein the radio broadcast receiver comprises a cassette driving mechanism such that a changeover between cassette operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry in the 10-key keyboard in cassette operation, a direct title selection for a cassette situated in the cassette driving mechanism is performed.

31. Radio broadcast receiver according to claim 22, wherein the radio broadcast receiver comprises a compact disk player such that a changeover between compact disk operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry at the ten-key keyboard in compact disk operation, a direct title selection for a compact disk situated in the compact disk mechanism is performed.

32. Radio broadcast receiver according to claim 1, whereby a direct entry of the frequency to be received is made by an entry at the 10-key keyboard in radio broadcast receiving operation.

33. Radio broadcast receiver according to claim 32, whereby a characterization of a frequency input at the 10-key keyboard is performed by operating the zero key on the 10-key keyboard before entering the frequency.

34. Radio broadcast receiver according to claim 32, wherein entry of a telephone number is performed by an entry at the 10-key keyboard in telephony operation.

35. Radio broadcast receiver according to claim 32, wherein the radio broadcast receiver comprises a cassette driving mechanism such that a changeover between cassette operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry in the 10-key keyboard in cassette operation, a direct title selection for a cassette situated in the cassette driving mechanism is performed.

36. Radio broadcast receiver according to claim 32, wherein the radio broadcast receiver comprises a compact disk player such that a changeover between compact disk operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry at the ten-key keyboard in compact disk operation, a direct title selection for a compact disk situated in the compact disk mechanism is performed.

37. Radio broadcast receiver according to claim 32, wherein the radio broadcast receiver is connected with a

compact disk changer such that a changeover between compact disk changer operation and other functions of the radio broadcast receiver is performed by the selector key, wherein by an entry at the 10-key keyboard in compact disk operation, at least one selection from the group comprising a direct selection of a compact disk situated in the compact disk changer or a direct title selection for a compact disk situated in the compact disk mechanism are performed, and wherein a characterization of the selection of a compact disk is performed by operating the corresponding key of the 10-key keyboard at least for an additional present time.

38. Radio broadcast receiver according to claim 32, wherein the keys of the 10-key keyboard there are associated with at least one of the following steps from the group comprising a plurality of alphanumerical signs or special signs, the desired sign being selectable by single or multiple operation of the corresponding key, and wherein at least one key is provided for switching the 10-key keyboard between alphanumerical entry and numerical entry.

39. Radio broadcast receiver according to claim 32, wherein by entry of alphanumerical signs at the 10-key keyboard in radio broadcast receiving operation a naming of at least one transmitter is performed.

40. Radio broadcast receiver according to claim 32, wherein by entry of alphanumerical signs at the 10-key keyboard in telephone operation, a naming of at least one speed-dialing memory location is performed.

41. Radio broadcast receiver according to claim 32, whereby the distinction of a frequency input at the 10-key keyboard is performed by operating the zero key of the 10-key keyboard before entering the frequency.

42. Radio broadcast receiver according to claim 1, wherein entry of a telephone number is performed by an entry at the 10-key keyboard in telephony operation.

43. Radio broadcast receiver according to claim 42, whereby the distinction of a frequency input at the 10-key keyboard is performed by operating the zero key of the 10-key keyboard before entering the frequency.

44. Radio broadcast receiver according to claim 1, wherein the radio broadcast receiver comprises a cassette driving mechanism, wherein a changeover between cassette operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry in the 10-key keyboard in cassette operation, a direct title selection for a cassette situated in the cassette driving mechanism is performed.

45. Radio broadcast receiver according to claim 1, wherein the radio broadcast receiver comprises a compact disk player, wherein a changeover between compact disk operation and other functions of the radio broadcast receiver is performed by the selector key and wherein by an entry at the ten-key keyboard in compact disk operation, a direct title selection for a compact disk situated in the compact disk mechanism is performed.

46. Radio broadcast receiver according to claim 45, whereby an entry of alphanumerical signs at one of the locations chosen from the group comprising the 10-key keyboard in compact disk operation or in compact disk changer operation, a naming of at least one compact disk is performed.

47. Radio broadcast receiver according to claim 46, wherein by entry of alphanumerical signs at the 10-key keyboard in telephony operation, the setting up of a message is performed which can be transmitted by subsequent changeover of the 10-key keyboard to numerical entry and by entering a telephone number.

48. Radio broadcast receiver according to claim 1, wherein the radio broadcast receiver is connected with a

compact disk changer, wherein a changeover between compact disk changer operation and other functions of the radio broadcast receiver is performed by the selector key, wherein by entry at the 10-key keyboard in compact disk operation, at least one selection from the group comprising a direct selection of a compact disk situated in the compact disk changer or a direct title selection for a compact disk situated in the compact disk mechanism are performed, and wherein a characterization of the selection of a compact disk is performed by operating the corresponding key of the 10-key keyboard at least for an additional present time.

49. Radio broadcast receiver according to claim 48, wherein by entry of alphanumerical signs at one of the locations chosen from the group comprising the 10-key keyboard in compact disk operation or in compact disk changer operation, a naming of at least one compact disk is performed.

50. Radio broadcast receiver according to claim 1, wherein the keys of the 10-key keyboard there are associated with at least one of the following steps selected from the group comprising a plurality of alphanumerical signs or special signs, the desired sign being selectable by single or multiple operation of the corresponding key and wherein at least one key is provided for switching the 10-key keyboard between alphanumerical entry and numerical entry.

51. Radio broadcast receiver according to claim 50, wherein by entry of alphanumerical signs at the 10-key keyboard in telephone operation, a naming of at least one speed-dialing memory location is performed.

52. Radio broadcast receiver according to claim 51, wherein by entry of alphanumerical signs at one of the locations chosen from the group comprising the 10-key keyboard in compact disk operation or in compact disk changer operation, a naming of at least one compact disk is performed.

53. Radio broadcast receiver according to claim 50, wherein by entry of alphanumerical signs at the 10-key keyboard in telephony operation, the setting up of a message is performed which can be transmitted by subsequent changeover of the 10-key keyboard to numerical entry and by entering a telephone number.

54. Radio broadcast receiver according to claim 50, wherein by entry of alphanumerical signs at one of the locations chosen from the group comprising the 10-key keyboard in compact disk operation or in compact disk changer operation, a naming of at least one compact disk is performed.

55. Radio broadcast receiver according to claim 50, whereby an entry of alphanumerical signs at the 10-key keyboard in radio broadcast receiving operation a naming of at least one transmitter is performed.

56. Radio broadcast receiver according to claim 55, wherein by entry of alphanumerical signs at the 10-key keyboard in telephone operation, a naming of at least one speed-dialing memory location is performed.

57. Radio broadcast receiver according to claim 55, wherein by entry of alphanumerical signs at one of the locations chosen from the group comprising the 10-key keyboard in compact disk operation or in compact disk changer operation, a naming of at least one compact disk is performed.

58. Radio broadcast receiver according to claim 1, wherein the broadcast receiver is an auto radio.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,160,997
DATED : December 12, 2000
INVENTOR(S) : Ralf Oberlaender

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 7, claim 6,

Line 67, change "such that" to -- wherein --.

Column 8, claim 7,

Line 8, change "such that" to -- wherein --.

Column 8, claim 8,

Line 16, change "changer" to -- wherein --.

Line 18, delete -- that --.

Line 18, delete -- an --.

Line 18, before "by" insert -- wherein --.

Column 8, claim 9,

Line 29, after "steps" insert -- selected --.

Column 9, claim 16,

Line 1, after "changer" insert -- such that --.

Column 9, claim 25,

Line 59, after "changer" insert -- such that --.

Column 11, claim 37,

Line 1, delete -- such that --.

Column 12, claim 48,

Line 1, delete -- wherein --.

Signed and Sealed this

Twenty-third Day of October, 2001

Attest:

Nicholas P. Godici

Attesting Officer

NICHOLAS P. GODICI
Acting Director of the United States Patent and Trademark Office